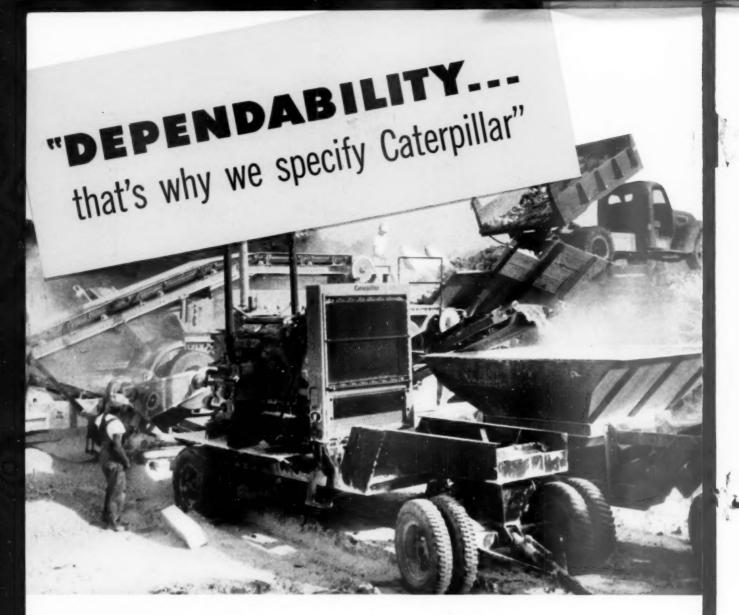
THE INDUSTRY'S RECOGNIZED AUTHORITY

# ROCK PRODUCTS

LARGEST PRODUCER CIRCULATION IN THE HISTORY OF THE FIELD





George M. Baker, of Lockwood, Mo., has enlisted a thrifty, hard-working Caterpillar D364 Diesel Engine to help him wage his personal battle against rising costs in rock crushing.

His fuel bills are the payoff. To produce power to crush 60 tons of rock per hour, the budget-minded 265-HP Cat\* Diesel uses only 10 gallons of fuel. This tightfisted Diesel is the steady power plant for a Cedarapids  $20 \times 25$  crusher and two conveyor belts.

The big yellow engines exert a double squeeze on your costs. They produce up to 500 horsepower on low-cost No. 2 furnace oil—and they do it without fouling! But equally as important, they go to work on maintenance costs and expensive down time because they are built for long, productive lives. Listen to Mr. Baker:

"In our business, dependability is the important thing. If one engine breaks down, the whole job stops. We specify Caterpillar to maintain production."

Your Caterpillar Dealer will be happy to show you how these rugged engines will turn red ink to black. And remember they are available in machines built by leading manufacturers. Specify *Caterpillar* power in the equipment you buy and be money ahead!

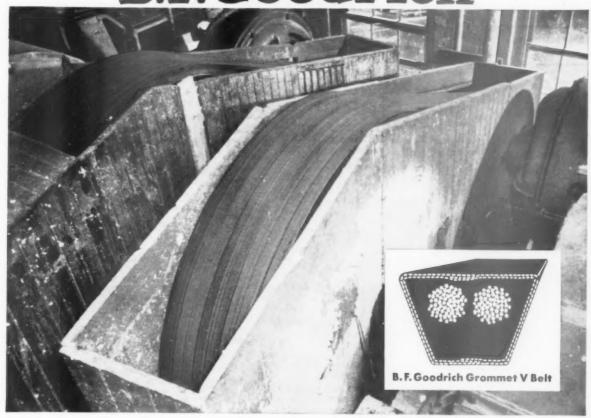
Caterpillar Tractor Co., Peoria, Illinois.

#### CATERPILLAR\*

\*Bath Cat and Caterpillar are registered trademarks—(R

NAME THE DATE...
YOUR DEALER
WILL DEMONSTRATE

RESEARCH KEEPS B.F.Goodrich FIRST IN RUBBER



# 11 to 1 service record proves B. F. Goodrich belts last longer

#### User reports 3-way saving with grommet V belts

ORDINARY V belts on these drives lasted only a year. They couldn't take the 24-hour-a-day service, the heavy loads. Covers would separate from the belt, flap around the drive, get caught in pulleys, then tear off completely. Then a B. F. Goodrich distributor recommended grommet V belts. It proved to be a perfect solution. Installed in 1941, both sets of grommet V belts have already lasted 10 times longer, and still look good for years' more service. Here's why BFG grommet belts outlast and outperform ordinary belts:

#### No weak spots

The section where cords overlap is the weak spot in ordinary belts. That's where 85% of belt failures occur. But in B. F. Goodrich grommet V belts

this cause of belt failures has been eliminated. All of the cord material in a grommet belt is *concentrated* in twin grommets. These grommets are cord loops, made like giant twisted cables except that they're endless. There are no splices or overlaps—no weak spots to cause premature belt failures.

#### Better grip, less slip

Grommet V belts have more rubber in relation to belt size. Without any stiff overlap, they're more flexible, grip pulleys better. Size for size, grommet belts give ¼ more gripping power, pull heavier loads with a higher safety factor. Because there is less slip, there is also less surface wear.

#### Save 3 ways

This company, like many others, is

making a 3-way saving with grommet V belts. First, they save on replacement costs because grommet belts last longer. They save on production costs with no shutdowns caused by belt failures. And they save on maintenance costs because these belts need less attention. Yet the savings they make are clear profit because grommet belts cost not one cent more than ordinary V belts. Next time you need V belts, order grommet V belts from your BFG distributor. The B. F. Goodrich Company, Industrial & General Products Division, Akron, Ohio. (Available in Canada).

Gnommet V. Betts
B.F. Goodrich
FIRST IN RUBBER

ROCK PRODUCTS, April, 1953



#### APRIL, 1953

#### **ROCK PRODUCTS**

THE INDUSTRY'S RECOGNIZED AUTHORITY



VOL. 56, No. 4

Bror Nordberg

Nathan C. Rockwood

Editorial Consultant

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#### FLEXIBILITY

#### with side-dumps only!

WITH EASTON SIDE-DUMP FLEXIBILITY you can change quickly from a single dump truck to a large capacity truck-and-trailer combination — or from a single trailer to either a truck-and-trailer or a double-trailer combination. This flexibility, possible only with side-dump equipment, provides for rapid, low-cost conversion to meet changing job-to-job requirements, increased production requirements, or newly developed job conditions. You make your best plans now and for the future when you start hauling with EASTON SIDE-DUMPS.

#### as a TRAILER

EASTON TRAILERS are built in all three of EASTON's basic side-dump designs — dworless pan, lift door and drop door.

The unit illustrated is an EASTON TYPE TD automatic drop door trailer, hydraulically dumped.



#### as a

#### TRUCK BODY

EASTON TRUCK BODIES are also available in the three standard basic EASTON designs and in several capacities. The unit illustrated is an EASTON TYPE BD automatic drop door body, hydraulically dumped.

#### as a **COMBINATION**

EASTON SIDE-DUMPS, of any type, may be joined in truck-and-trailer or double-trailer combinations to be used as single units or in combination, as required. The unit illustrated is an EASTON TYPE TD double-trailer combination, hydraulically dumped. Overall capacity, 45 tons.





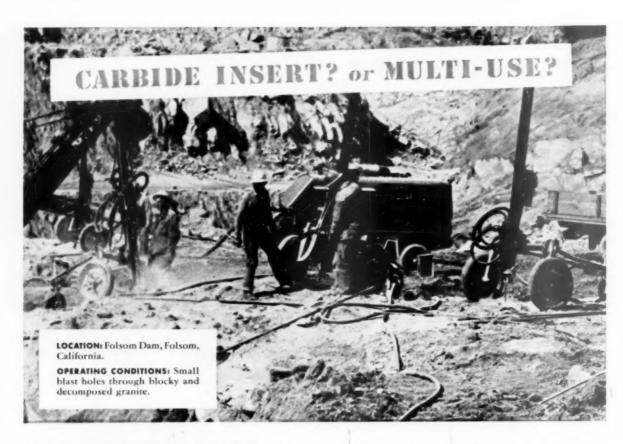
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#### INVESTIGATE EASTON SIDE-DUMP FLEXIBILITY!

EASTON

Conversion equipment may be supplied for units now in service, as well as on new orders. Consult EASTON for a qualified engineering recommendation. Write today . . .

EASTON CAR & CONSTRUCTION COMPANY . EASTON, PA.



# With TIMKEN® carbide insert bits, H. Earl Parker Co. drills foot of granite per minute of drilling time, averages 600 ft. of hole per bit!

APPROXIMATELY a foot of penetration per minute while drilling! An average of 600 feet of hole per bit! Bit cost materially reduced. These are the results H. Earl Parker Company says it obtained by using Timken<sup>2</sup> carbide insert bits to drill small blast holes at the Folsom Dam project in California.

Timken carbide insert bits are always your best answer for highest speed through hard and abrasive ground. They're also most economical for constant-gage holes, small diameter blast holes and very deep holes.

But they are not the best answer to all of your drilling problems!

More economical for ordinary ground are Timken multi-use bits. With correct and controlled reconditioning, they'll give you the lowest cost per foot of hole when full increments of steel can be drilled.

To make sure you're using the best bit type for your drilling requirements, call on the Timken Rock Bit Engineering Service. Twenty years of rock bit experience have made the Timken Company the leader in the field. It has an extensive field engineering service. And it makes both types of bits—both of which are interchangeable on the same steel.

Whichever you choose—carbide insert or multi-use— Timken rock bits have these important advantages: (1) made from electric furnace Timken fine alloy steel, (2) special shoulder unions which protect threads from drilling impact, (3) quickly and easily changed.

For help in selecting the best bits for your job, write The Timken Roller Bearing Company, Rock Bit Div., Canton 6, Ohio. Cable address: "TIMROSCO".



Timken threaded multi-use rock bit



Timken threaded carbide insert rock bit

TIMKEN

your best bet for the best bit . . . for every job

is this company's business!

No. FOUR
NORTHWEST

Gordon Bros. Quarries, Inc.
Forest City, Mo.

—and the rock plant is the company's factory. Any situation like that needs dependability on the "feeding" end and that is why a new Northwest 3/4 yd. shovel is there in the pir.

This is the fourth Northwest that Gordon Bros. Quarries, Inc., has owned so they knew they were getting dependability when they installed it. They have proved Northwests in their own rock so to speak.

Northwest advantages are worth having and it pays to bank on the successful experience of others. Why not plan on a Northwest? Learn about them now and talk it over with a Northwest man.

NORTHWEST ENGINEERING COMPANY

135 South La Salle Street, Chicago 3, Illinois

# NORTHWEST

SHOVELS

CRANES

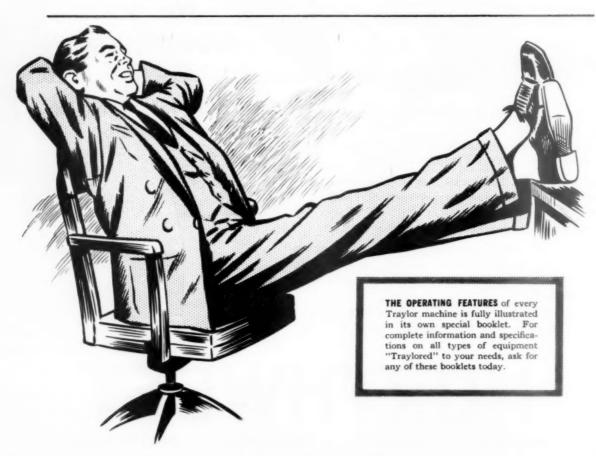
DRACLINE

**PULLSHOVELS** 

Convertible for any Mining Material Handling or Excavation Problem

# Everything's control under control

ALL Traylor equipment, made for the production of agricultural lime stone and lime products, is designed to attain the greatest degree of product control. To assure the highest quality of the end-product, the design of every Traylor machine is based on features developed over the last 50 years by Traylor's own corps of engineers. These features are exclusively Traylor's . . . job-tested and proved in installations all over the world. It is these features that offer closer control over all phases of your production. For a high quality product at low cost, buy Traylor . . . and relax.



# with Traylor Machinery for the production of lime products



TRAYLOR ROTARY KILNS feature easily adjustable supports and single section rigidity of all-welded steel shells. These features assure perfect alignment to cut maintenance costs and reduce power requirements. All Traylor Rotary Kilns are designed to meet the particular requirements of each installation.



TRAYLOR ROTARY COOLERS employ the same exclusive design principles as Traylor Kilns... offer the same maintenance economies and are built to individual specifications. Traylor makes three types of coolers to meet practically all requirements; Conventional, Diaphragm and Multiple Tube. Special coolers are provided.



TRAYLOR JAW CRUSHERS are of massive construction for heavy-duty primary breaking. They are designed in five types with feed openings ranging from  $8'' \times 12''$  up to  $60'' \times 84''$ . Each type features Traylor's exclusive curved jaw plates which deliver a greater tonnage of finer product with less horse power.



TRAYLOR TY REDUCTION GRUSHER is noted for its simple, compact design for maximum strength and operating efficiency. Non-chokable, self-tightening Bell Head and Curved Concaves produce an exceptionally uniform product with fewer waste fines. Available in six sizes with feed openings from 3" to 22".



TRAYLOR ENGINEERING & MANUFACTURING CO. 565 MILL ST., ALLENTOWN, PA.

SALES OFFICES: New York - Chicago - San Francisco Canadian Mfra: Canadian Vickers, Ltd., Montreal, P.Q.



#### QUICK-W

**Speeds Output Increases Profits for ROCK PRODUCT OPERATORS** 

Whether its moving shot rock, sand, or crushed stone, stripping overburden or charging bins, you'll find the "QUICK-WAY" in a class by itself in the ¼ to ½ yard field.

The "QUICK-WAY" features low center of gravity, works easily over the side, has proper balance for truck operation, gives you easy, fast swinging, plenty of reserve power, rugged all steel construction, numerous parts interchangeable. 4 models, 1/4 to 1/2 cubic yard shovel, clamshell, dragline, backhoe, 3 to 10 ton crane capacity. Truck speeds to and from jobs. Low initial cost. Low maintenance costs. Eight different attachments.

> With a "QUICK-WAY" you'll roll up yardage records hour after hour, day after day. Ask your distributor for a free demon-

stration or mail coupon.



Model E dragline with 30' boom



Clinker is handled from the pit to the storage pile and from the storage pile to grinding circuit with a mobile "QUICK-WAY" crane

TRUCK SHOVEL CO.

Denver, Colorado, U.S.A.



"QUICK-WAY" truck shovel, loading sand

#### MAIL COUPON TODAY

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Dept. 130 • 2401 East 40th Ave. • Denver 1, Colorado

Please send me complete details on "QUICK-WAY" Truck Shovels -four different models from 3 to 10 ton crane capacity.

Name

Address

City



crane with skull cracker attachment eliminates secondary shooting

### **WHY**

Gates V-Belts Wear Longer-





Take any straight-sided V-Belt (Fig. 1) and bend it as it bends in going around its pulley. You will clearly see its sides bulge out (Fig. 1-A). These sides therefore press unevenly against the V-pulley and this causes extra wear at the point shown by arrows (Fig. 1-A).



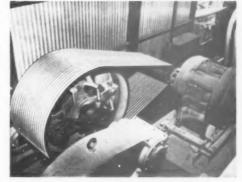


Now bend a Gates Vulco Rope with CONCAVE SIDES (Fig. 2).

You will see the precisely engineered CONCAVE SIDES fill out to an exact fit in the sheave-groove (Fig. 2-A). The sides press evenly against the V-pulley. All wear is distributed uniformly across the full width of the Gates Vulco Rope—and this means longer belt life and lower belt costs for you.







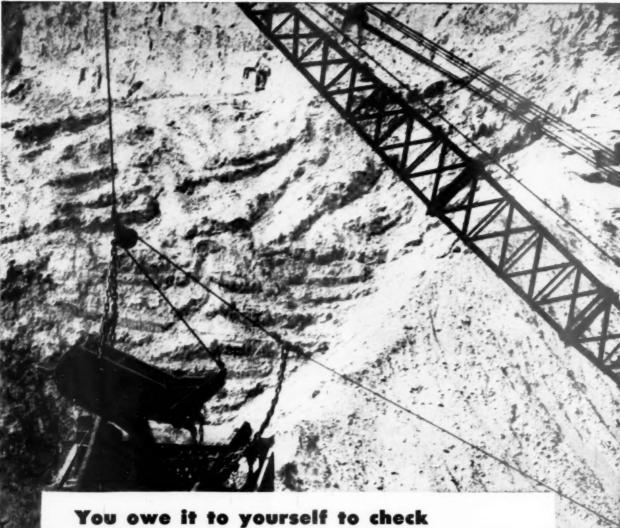
Typical Gates Vulco Rope Drive—the Gates V-Belts are built with Concave Sides to insure longer belt wear.

When you buy V-Belts, he sure to get the V-Belt with the CONCAVE SIDES—the Gates Vulco Rope!

Gates Engineering Offices and Jobber Stocks are located in all industrial centers of the United States and in 71 foreign countries.

V-Belts — Hose Molded Rubber Goods for industry World's Largest Maker of V-Belts





# "KOEHRING WORK CAPACITY"

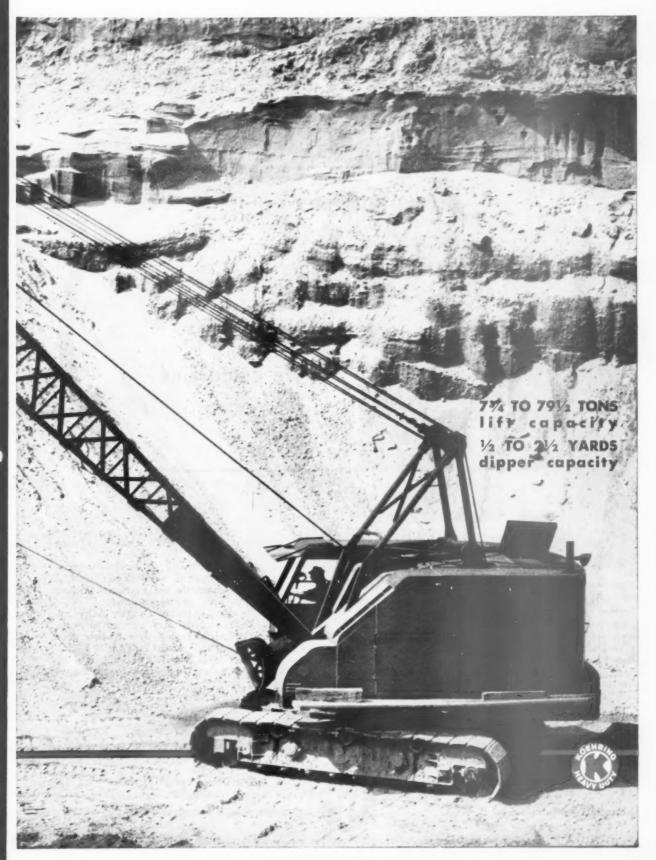
While mechanical features, operating advantages, speeds and capacities are important to excavator and crane efficiency... final proof of profit earning value is in cost per yard moved or ton lifted. That's why you owe it to yourself to get all facts on "KOEHRING WORK CAPACITY".

For specific figures, see your Koehring distributor.

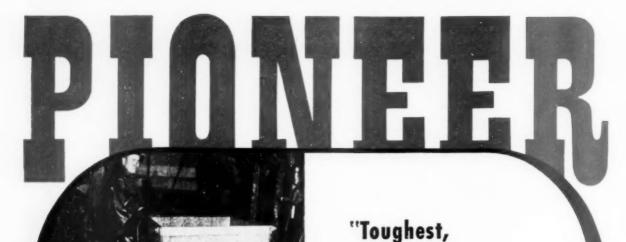
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KOEHRING COMPAN

MILWAUKEE 16, WISCONSIN



#### Industrial rubber products especially built for LONG SERVICE





#### A NEW DEVELOPMENT-PIONEER TRACK KING

TRACK KING gets its exceptional strength and light weight through use of a tightly waven, lough nylon reinforcement. Its cover is abrasion and impact-resistant Pieneer Rubber—bright yellow for peak visibility.

The arrival of Pioneer TRACK KING was a revelation to the men digging this wet, narrow Seattle sewer tunnel. After a long struggle with ordinary cumbersome pneumatic hoses, it was really a pleasure to handle TRACK KING. And yet it proved more capable of taking the unusually tough punishment found on this 1400-foot tunnel job.

Air hose was important because drilling, shoring, and transporting were all done pneumatically. The workmen not only had to contend with the cramped conditions of a ninefoot face, but also had to fight 52,000 gallons of seepage

Lightest Hose

We Could Find"

Pioneer TRACK KING made the best of this tough, crowded assignment. The men said they hardly noticed this light weight hose on their pneumatic tools, in contrast to previous bulky hoses. It improved the efficiency of every tool on the job.

Regarding its strength, Walter Carlson, the superintendent, said this: "In spite of the watchfulness of the men and the bright yellow cover, the trucks ran over the hose five or six times a day with no apparent damage."

In getting this tough tunnel job under way the Valley Construction Company tried nearly every premium pneumatic hose on the market. But they were really enthusiastic when they found exactly what they wanted in TRACK KING.

Investigate Pioneer TRACK KING, yourself. It is the lightest, strongest air hose you can buy. Ask your Pioneer representative for complete details on this and the many other Pioneer industrial rubber products available now.

#### PIONEER RUBBER MILLS

Pioneering in rubber since 1888

BRANCHES: CHICAGO • DALLAS • LOS ANGELES MILWAUKEE • ST. LOUIS • SAN FRANCISCO

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MAIN OFFICE: PIONEER BUILDING . 353 Sacramento Street, San Francisco 11



#### Allis-Chalmers Motor Wagon

built to meet today's high production demands



**DUMPS SAFELY...CLEANLY** — Wheel base remains constant during entire dumping cycle. With this stable wheel base, operator may back to the very edge of a steep fill, set the powerful air brakes on *all four* wheels and put the entire load over the edge.



Clean interior, plus high, 70-degree tilt assures complete load ejection. Body may be heated by exhaust to prevent freezing of materials in severe temperatures.





MULTIPLY TRACTOR USE WITH INTERCHANGEABLE SCRAPER BODY... for stripping and other self-loading operations. TS-200 Motor Scraper is a high-speed, rubber-tired unit with 13-yard capacity, "through-the-center" boiling action for easy loading, positive forced ejection and many other high-production features.

Ask your Allis-Chalmers dealer for the full story.

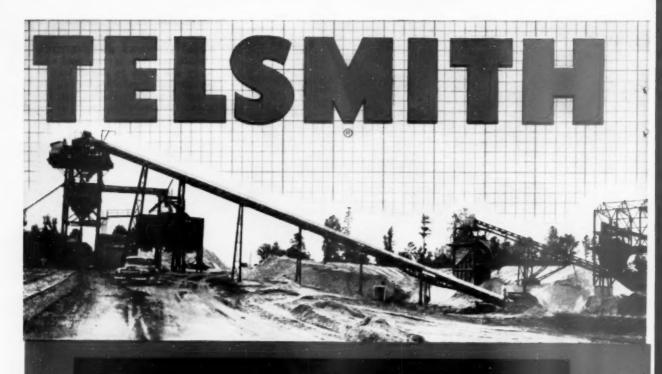
TRAVELS FAST — High horsepower-toyardage ratio and large, high-traction rocklug tires give fast average travel speeds even on adverse grades and heavy going. Delivers more loads per hour; reduces idle shovel time.

#### ALLIS-CHALMERS MODEL TR-200 REAR-DUMP MOTOR WAGON

Choice of Engines—165 hp. Cummins; 176 hp. Buda. Capacity — 15 cu. yd., heaped; 18 tens. Speeds — Five forward to 21.6 mph.; reverse to

Hydraulic steering and dumping

ALLIS-CHALMERS



NEW Tyrone Rock Products Co. plant PRODUCES 3000 TONS A DAY at low cost...with TELSMITH Conveying and Screening Equipment

#### TELSMITH

#### **Equipment** in this Plant

One (1) 5' x 12' Pulsator Single Deck Scalping Screen

Scalping Screen
One (1) 5' x 12' Pulsator Double Deck
Scalping Screen

One (1) 4' x 10' Pulsator Double Deck Rinsing Screen

Eight (8) 5' x 12' Vibro-King Single Deck Finishing Screens

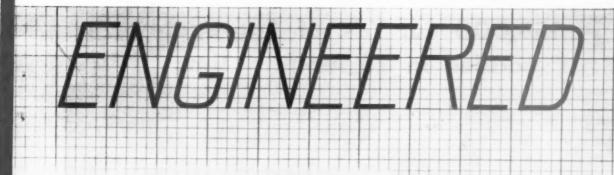
Two (2) 4' x 10' Vibro-King Single Deck Finishing Screens

Twelve (12) Telsmith-BG Conveyors 18" to 42" wide, 42" to 200' long

Fifteen (15) 16" x 18" Bin Gates Boquad Tunnel Type ● To serve the rapidly growing Atlanta market, this modern plant at Tyrone, Ga., is a remarkably efficient, low-cost operation. Designed and engineered by Telsmith, its average capacity is about 300 tons per hour with peaks of 450 tons. Highly efficient screening is supplied by 13 Telsmith vibrating screens making 8 sizes of crushed granite (-2" to -8 mesh) for railroad ballast, and concrete and asphalt construction.

Finished sizes are stockpiled over a reclaiming tunnel, then rinsed and delivered to bins for loading cars and trucks. Telsmith did all engineering, including detailed drawings, furnished all screens and conveyors and carefully co-ordinated all equipment for smooth, efficient operation. To relieve yourself of technical details and to be sure of satisfactory results, consult Telsmith without obligation. Send for Bulletin 266.

SMITH ENGINEERING WORKS
508 EAST CAPITOL DRIVE, MILWAUKEE 12, WISCONSIN





#### VIBRO-KING

For Finished Screening of Medium and Small Sized Aggregate

With its two bearings, the Vibro-King is simpler, more efficient, and upkeep is lower. Telsmith-patented automatic counter-weights assure smooth starting and stopping as well as exceptionally smooth operation. Its circular screening movement is uniform everywhere on the screen cloth, and is constant under any load. Entire vibrating mechanism, including vibrating unit and screen cloth, floats on nests of springs. Welded and reinforced main frame is *borizontal* for rigidity and easy installation. Cable suspension, if desired. Five sizes, 1, 2, or 3 decks.

#### PULSATOR

#### For Heavy-Duty Scalping

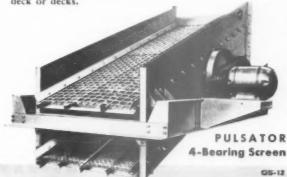
A four-bearing, heavy-duty vibrator... for all kinds of screening, especially scalping, or large sized aggregate... Pulsator's circular movement gives uniform, efficient screening on all decks and under heaviest loads. The best alloy steels, the finest anti-friction bearings, protected by both labyrinth and piston ring seals, give longer life and lower upkeep. Eleven sizes, with 1, 2, or 3 decks.

Changing Screen Cloth is Simple and Quick — The upper end of the Vibro-King is readily removable, making it a much easier job to change screen cloth and saving a great deal of time.

VIBRO-KING

2-Boaring

Screen Cloth Mounting—At customer's option — screen cloth may be mounted in rubber on steel screen trays; or stretched over steel screen supports—protected by rubber—on any deck or decks.



Cable Address: Sengworks, Milwankee

51 East 42nd St. 211 W. Wacker Drive 713 Commercial Trust Bidg. 238 Main Street Boehck Eqpt. Co. A. N. Wigle, 294-6 N. Rossevelt Ct. New York 17, N.Y. Chicago 6, iii. Philadelphia 2, Pa. Cambridge 42, Mass. Milwaukee 3, Wis. Columbus 9, Ohio Clyde Equipment Co., Portland 9, Ore., & Seattle 4, Wash. 0 Mines Eng. & Eqpt. Co., San Francisco 4, Calif. 0 Interstate Equipment Co., Statesville, N. C. 0 Rish Eqpt. Co., Charleston 22, & Clarksburg, W. Va. — Rosnoke 7, & Richmond 10, Va. 0 Wilson-Weesner-Wilkinson Co., Knozville 8, & Nashville 6, Tenn.

#### 158,000 Cu. Yds. of Aggregate Loaded in 26 Months' Time



#### A Shoveloader® Performance Report

Month after month this rugged Shoveloader worked steadily, dependably delivering top pay loads every operating day. 26 months later it had proved to its owner, beyond any doubt, that it was built to take the worst in punishment while delivering the best in performance. Inspect the Shoveloader at your distributor! See its rugged frame, its hydraulically controlled bucket, its powerful hoisting cylinders and its rugged tractor. Ask for a demonstration and see why these Shoveloaders are built to outlast and outperform any other loader!

Shoveloaders mount exclusively on dependable Case, Minneapolis-Moline, Oliver and Sheppard industrial-type tractors. Contact these dis-tributors for complete information or send for the fact-packed bulletin.

most efficient machine for his jobs and has now purchased another unit. The easily added snow and coal bucket, fork, bulldozer, crane and broom attachments keep the

tires. Frequent timing of the operator showed he could load a 6 cu. yd. truck box in 41/2 minutes. Mr. Jones considers his Shoveloader the

Facts and specifications on wide range of models are given in Bulletin AD-32A. Write for it today.



Baker 

handling equipment

THE BAKER-LULL CORPORATI

Formerly the Lull Manufacturing Company

382 WEST 90th STREET . MINNEAPOLIS 20, MINN. A Subsidiary of the Baker-Raulang Co., Cleveland 2, Ohio

ROCK PRODUCTS, April, 1953

#### COMPLETE UNIVERSAL PACKAGE

PROFITABLE AGLIME



COMPLETE QUARRY PLANT IN ONE PACKAGE

Here's high portability, extreme flexibility, and profit-making capacity that lets you produce agline in volume near your market, or shift to road rock when the season changes. The Universal 293QH Limerok is engineered for top output and economy with high capacity jaw crusher primary, hammermill secondary and gyrating screen mounted on a single chassis. It loads direct from quarry and produces aglime, road rock and chips simultaneously or separately. Delivers finished material to trucks or stockpiles. A smooth operating, proved profit-maker.



THE UNIVERSAL 546P PORTABLE PRIMARY CRUSHING UNIT



THE UNIVERSAL 1800 SERIES PORTABLE HAMMERMILL SECONDARY CRUSHING UNIT

The 546P Primary and 1800 Secondary, available in various sizes, make possible the selection of a balanced combination to meet a wide range of production requirements.

Portable or stationary—whatever your requirements for producing essential aglime UNIVERSAL builds the combination you need for more tons per hour at lowest cost per ton. Contact your Universal distributor for complete information or write direct.

#### PROFIT TODAY . . . **BUILD FOR TOMORROW**

WITH UNIVERSAL AGLIME EQUIPMENT



Hammermills



UNITS

Jaw Crushers



Aglime Screens



Apron Feeders



Aglime Conveyors



Aglime Bins

#### UNIVERSAL ENGINEERING CORPORATION Subsidiary of PETTIBONE MULLIKEN CORPORATION

617 C Avenue N.W., Cedar Rapids, Iowa Phone 7105

4700 West Division St., Chicago 51, Illinois Phone Spaulding 2-9300





# \$15,000

Last June, a Boston Distributor Salesman made a brief call at the offices of a coal mine operator whose production costs were threateningly high, Heavy, abrasive loads and mildew were killing belts in a matter of months.

#### BOSTOWN WOVEN HOSE & RUBBER COMPANY

Later, he recommended Boston Conveyor and Elevator Belt Systems which since then have been in operation without a breakdown ... saving this mine over \$15,000 in operation costs in ten months.

Your Boston Distributor Salesman is a trained production expert specializing in rubber equipment for industrial production. He can offer you a complete line of Rotocured Boston Flat Belting and V-Belts... free from press overlaps and mechanical distortion... with greater load-carrying capacity, more even stretch and longer flex life. He offers a line of Boston Steam Hose that is sturdy, static-resistant, swell-resistant... that provides you with greater safety, durability, flexibility and ease of handling. He can have special equipment tailored to your operations and delivered in record time.

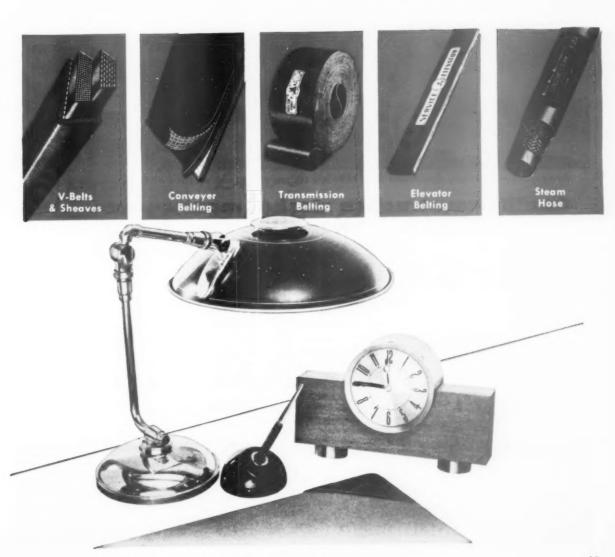
The Boston man is coming to see you. Can you afford not to see him?

#### BOSTON WOVEN HOSE & RUBBER COMPANY

MAIN PLANT, CAMBRIDGE, MASS., P.O. ROX 1071, BOSTON, MASS.

DISTRIBUTORS OF A COMPLETE LINE OF MECHANICAL RUBBER PRODUCTS IN ALL PRINCIPAL CITIES

# for 15 minutes of your time!



Before you buy:

### **CHECK SERVICE RECORDS!**



Here a fast, rugged and highly maneuverable 1 yard LS-90 with 11/4 yard dragline loads out gravel for Colorado road surfacing job.

#### Quality construction slashes maintenance costs ... matchless service minimizes downtime

#### WHAT OWNERS AND OPERATORS SAY ABOUT LINK-BELT SPEEDERS...

OWNER—"Only service in 18 months was two sets of cable, minor dipper repairs."

OWNER-". . . really fine distributor

OWNER—"My Link-Belt Speeder not only replaced two smaller rigs, but cost only \$115 for service in five seasons!" OPERATOR—"Running it over two years

with no downtime."

OWNER—"Best dollars I ever spent..."

OPERATOR—"...easy access for service.

Self-cleaning crawler treads are really

OPERATOR — "Only one clutch adjustment in eight months!" WITH a Link-Belt Speeder, you're sure to get maximum production at minimum cost—not only for this season ... but for many seasons to come! Also, with Link-Belt Speeder's world-wide factory-trained distributor service, you can be sure of prompt, expert service or parts replacement when you need them.

What's more, in every area there is a Link-Belt Speeder resident service engineer. It's his job to be acquainted with you and your particular problems.

If you'd like more information about the most complete line of crawler, wheel or truck-mounted shovel-cranes write for Catalog 2373.

LINK-BELT SPEEDER CORPORATION

Cedar Rapids, lowa

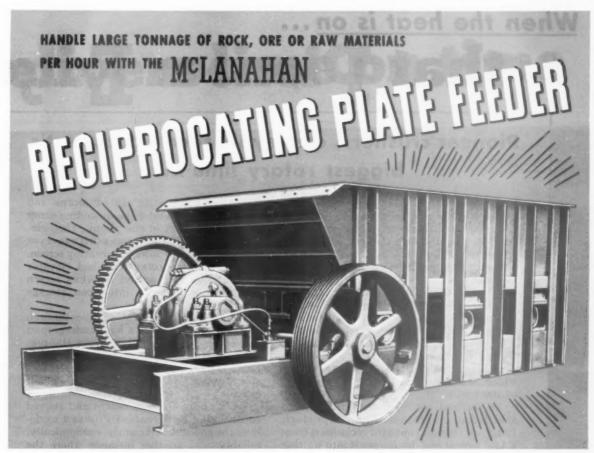
13,080

#### LINK-BELT SPEEDER

CORPORATION

BUILDERS OF A COMPLETE LINE OF CRAWLER, TRUCK AND WHEEL-MOUNTED SHOVEL-CRAMES

FACTORY-TRAINED
DISTRIBUTOR SALES
AND SERVICE SPECIALISTS
...EVERYWHERE





Push button-controlled 72" McLanchon Feeder delivering shovel loaded limestone to No. 30 gyratory.



A Maryland company uses two feeders: one to a law crusher, the other to a gyratery crusher.

#### Built to Handle Materials from Sand to Shovel Loaded Rock!

With its reciprocating plate design, this feeder automatically controls the rate of flow of material, and is easily adaptable to the producing capacity of a wide variety of processing equipment. In service, it can be loaded from trucks, cars, hoppers, storage bins . . . and feeds into crushers, washers, conveyors and other machines.

Through the use of this machine production costs are lowered and plant output and efficiency are remarkably increased. In your plant a McLanahan Reciprocating Plate Feeder will save expensive handling costs; eliminate choke-ups, spills, overloads on motors and drives, unnecessary wear and tear on machinery.



This feeder delivers shovel loaded limestone to a McLanchan single roll Rockmaster crusher in a large midwestern coment plant.

#### FOR BULLETIN

WRITE TODAY

Bulletin No. 4812 includes many product and application photos, technical details and specifications.

#### McLANAHAN & STONE CORPORATION

Pir, Mine and Quarry Equipment Headquarters Since 1835 Hollidaysburg, Pennsylvania

Dependable Products: Single and Double Roll-and Jaw Crushers, Crushing Plants, Reciprocating Plate and Apren Fooders, Rell Grizzlies, Conveyors, Elevators, Scroons, Scrubbers, Steel Log Weshers, Send Drugs, Holsts, Jigo, Bry Pane, Dryors, Scroop Bundlers, Pulleys, Georg, Bearings, Spreckets, Shoaves, Rollers, Bin Gates, Elevator Suckets, Gratings, Car Whools, Foreses and Bronze Castings.

When the heat is on...

# that Pioneer Edge

### Pioneer crushers, conveyors feed Southwest's biggest rotary lime kiln

Mere, just south of Cleburne, Texas, is one of the world's most remarkable lime-producing plants. With its unique system of preheating and a huge 130 foot rotary kiln, Limestone Products Company is turning out excellent quality lime at surprisingly low cost.

It was natural that the designers of this big, modern plant should choose PIONEER equipment for the important job of keeping it supplied.

Beginning in the quarry, a 12' PIONEER traveling grizzly receives the rock, feeds it evenly to a 24"x36" PIONEER jaw crusher which, with 75% crushing, has a capacity of 100 t.p.h.

An inclined conveyor and an overhead shuttle conveyor then stockpile the product. Later, an 18" belt conveyor reclaims it from a 125' tunnel and discharges it into waiting trucks for haulage to the lime plant. All three conveyors were made by PIONEER.

At the plant, stone is quickly reduced to

minus 1½" by a 30"x18" PIONEER roll crusher (located under the unloading ramp shown at the left of the photo), then elevated by an inclined PIONEER belt conveyor to a double-deck PIONEER vibrating screen. Another short PIONEER inclined elevator whisks stone to a second PIONEER screen which drops material into open storage piles below.

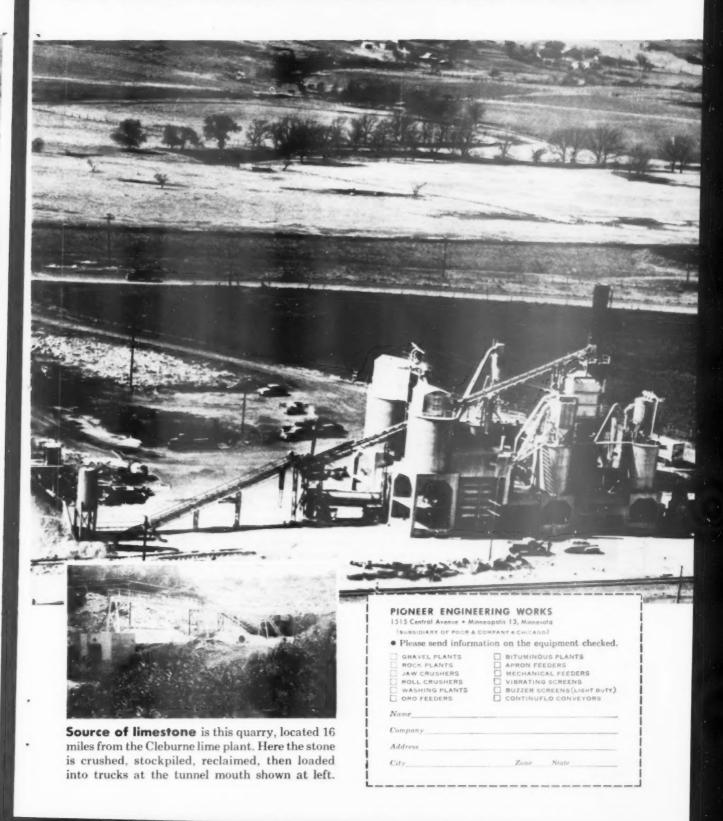
Stone is reclaimed from these piles through bin gates in the roof of a long underground tunnel, conveyed to a bin above the preheater for burning . . . or to the pulverizing plant for conversion to agricultural limestone, cattle feed, and roofing and asphalt filler.

Once again, superior design and rugged construction have enabled PIONEER to deliver the goods...efficiently, economically, reliably . . . another instance where the PIONEER EDGE has lowered operating costs while helping an experienced operator produce a superior product.



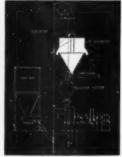


### delivers lime on time

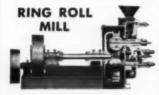


#### STURTEVANT AIR SEPARATORS

Produce
Aggregates
Hat meet
that meet
Government
Specifications



Sturtevant Air Separator in "closed circuit" with pulverizer. This combination increases tonnage and reduces costs in all types of industry.



Range 10 to 200 mesh. Use this mill in closed circuit with Sturtevant Air Separators. On dam projects throughout the country, Sturtevant Air Separators are helping contractors meet U. S. Corps of Engineers specifications for proper analysis of aggregates. Here's how—Sturtevant Air Separators de-dust and remove the fine fraction according to the mesh required. Dry or damp sand can be handled in any tonnage desired in ranges from 30 mesh and finer to eliminate screen in the production of intermediate sizes.

The de-dusted sand of proper mesh is then inter-blended with the screened sand or aggregates in the proper proportions providing aggregates that meet specifications. Sturtevant Air Separators are fast and accurate. They increase production of aggregates, cut production costs. Investigate Sturtevant Air Separators for your jobs. Write for details, today.

#### STURTEVANT MILL COMPANY

102 CLAYTON STREET, BOSTON 24, MASSACHUSETTS

Designers and Manufacturers of: CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS MECHANICAL DENS and EXCAVATORS • ELEVATORS • MIXERS

#### Are you keeping



#### as low as you can?



#### ASK OUR MAN!

He will demonstrate with facts why your best bet is bituminous coal. He will help you find the right kind and size of coal for your specific need; and he will show you up-tothe-minute ways of burning it efficiently and economically.

In Baltimore & Ohio territory, close to industry's doorstep, are bituminous coals in all varieties—for power, coking, steam, heating. Produced in highly mechanized mines, these coals are low in cost and uniform in size and quality. With the modern burning equipment now available, the efficiency and cleanliness of bituminous coal will amaze you!



Surprising economy. Conveniently accessible and highly efficient in modern use, bituminous coal from mines on the B&O keeps fuel costs low.



Convenient storage. Bituminous coal can be stored anywhere with safety. This eliminates the need for expensive storing facilities.



Reserves for centuries. Plants built for bituminous coal are assured a continuity of fuel supply regardless of emergencies. On the B&O alone, are reserves estimated at 25 billion tons!



#### Baltimore & Ohio Railroad

Bituminous Coals for Every Purpose



Marion shovel, loading a 34-ton coal payload into one of 23 Austin-Western trailers powered by Dart tractors. Scene is at Midland Electric Coal Corporation's strip mine near Farmington, III.

ASF Safety 5th Wheels have to be tough to stand up in this heavy-duty service, especially during wet weather when tractors are needed at each end of the semi to get it out of soft ground. Because ASF 5th Wheels are so easy to uncouple, in effect Midland has a flexible pool of load-carrying equipment and motive power, rather than 23 separate units. The result is fuller, more efficient use of available equipment.

Back and turn on a dime—In addition to quick interchange between motive power and load-carrying equipment, the tractor-trailer is highly maneuverable. ASF 5th Wheels are side-oscillating: even a full load can be safely and easily jacknifed for a short turning radius. Heart of the semi—the ASF 5th Wheel— 36" extra-heavy-duty ASF Safety 5th Wheel made for the rugged service and heavy loads found in off-highway work. Note the heavily reinforced plate; the massive "I" section center beam; the extra-strong mounting brackets. He speaks through firsthand experience — M. R. Heckard, Superintendent of Equipment, has used ASF Safety 5th Wheels on all semi's for 11 years. He particularly likes the comparatively new 36" wheel shown at left; feels it will cut maintenance costs to a new low.









The Midland Electric Coal Corporation proves that your best investment for efficient tractor-trailer operation is an ASF Safety 5th Wheel...

# Best of all-they're easy to uncouple

Ease of incoupling is one of the big reasons why ASF Safety 5th Wheels are standard equipment on the fleet of semi's at Midland Electric Coal Corporation's strip mine near Farmington, Ill. M. R. "Marty" Heckard, Superintendent of Equipment, says:

"We use ASF 5th Wheels on all our semi's, and each wheel takes a real beating during the loading and hauling of a 34-ton payload around 30 times a day.

"One of the main reasons why we like these 5th Wheels is because they are easy to keep free of slack. We just add a shim usually once a year.

"Best of all, however, they are easy to uncouple in a matter of minutes. We can easily shop the tractor for maintenance without the trailer, or vice versa. Working on one at a time makes servicing easier, and we avoid tying up the whole semi."

Quick interchange between motive power and load-carrying equipment is a real asset in mining and quarry work. And there's no denying that you get it with a tractor-trailer. But a 5th wheel—or any hitching device—tends to defeat its purpose if it's hard to uncouple.

Easy uncoupling can save you time, trouble and expense, as it has in this modern strip mine operation. But, it's equally important to know that the ASF Wheel only uncouples when you want it to uncouple. This is no beefed-up highway wheel. It's made specially for heavy-duty off-highway service, from the "I" section center beam to the side-oscillating plate that absorbs the sidestrain of uneven roadway. Until a twist of the wrist releases the king-pin, it's built to stay coupled—come shocks, strains or high water!

Get the facts on the best 5th wheel investment you can make! See your nearest ASF Distributor, or write: American Steel Foundries, Automotive Division, 410 N. Michigan Avenue, Chicago 11, Ill.

### remember this ... about ASS

Largest king-pin bearing area of ony 5th wheel... Stresses absorbed by a larger bearing area—larger than any other 5th wheel—means longer life for king-pin and jaws.

Shorter king-pin bending leverage ... Jaws grip the king-pin at the top. The pin stays straight—and can't "spring" or disengage.

Side oscillation protects equipment ... 1½° of free oscillation—plus 5½° controlled by rubber stabilizers—absorbs sidestrain of uneven roadway.

Heavy, cast alloy-steel construction... Plate is hinged on strong, rigid "I" beam with big 2" pin. Extra large contact area between plate and beam doubles rocker life. Both rocker and caststeel bracket are bronze-bushed to cut wear to a minimum.

Easy to maintain in perfect operating condition... Wear is inevitable, but on ASF Wheels, it's easily counteracted simply by inserting one or more low-cost shims between buffer and housing front wall. Result? Like-new service, without expensive rebuilding!

# safety 5 wheels

A quick glance tells you the lock is LOCKED . . .



LOCKED—as quickly shown by the lever position. The easy-to-see lever can only be in this position when the jaws are truly locked.



UNLOCKING — with an easy twist of the wrist. Simply move the safety dog up, and pull the lever forward.



unlocked — and ready for coupling. The lever moves back to locked position only when the jaws are locked!

A 3,000-pound "compression-grip" saves your maintenance dollars...



coupling — as the king-pin enters the jaws, the jaws are forced back against the exclusive ASF rubber buffer block, building up compression.



COMPRESSING — 3000 pounds are built up before the lock clears the rear jaw, allowing lock to snap to locked position.



LOCKED—and the jaws remain under compression. The grip is like a vise; eliminates the slack and backlash that can cost you money in added 5th wheel and king-pin wear.

# Why did this new crushed stone plant select U. S. Rubber belting?



WHY? Because U. S. Rubber's Matchless Style XN and YN Conveyor Belts with patented Nylon construction give more strength and safety-with no increase in cost. The designers of this new plant wanted to get the greatest output at the most economical cost. They picked "U.S." for all the belts in the plant, totaling over 4440 ft. Their engineers worked as a team with the engineers of the equipment manufacturer and the engineers of United States Rubber Company-a "3-Way Engineering" system which invariably brings lower conveying costs. For any materials handling problem, get in touch with "U.S." specialists at address below.

#### U. S. Matchless® Style YN

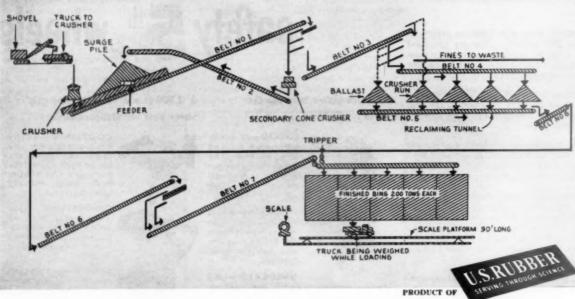
conveyor belt carrying crushed limestone rock from primary crusher to the vibrating screens.

#### U. S. Matchless Style XN

conveyor belt carrying secondary crushed oversized material to surge pile.

Flow of materials through the crushed stone plant.





UNITED STATES RUBBER COMPANY MECHANICAL GOODS DIVISION · ROCKEFELLER CENTER, NEW YORK 20, N. Y.

#### proved in our mines for better performance in yours



We-at Anaconda-are miners ourselves We know shovel cable because we use lots of it. Safety and uninterrupted flow of power are important in any mining operation. In both respects we know Securityflex® Type SH-D has a good record.



for longer "failure-free" service on big shovels, insist on

Butyl-Insulated Securityflex above 2kv



BUTYL INSULATION. This accounts for improved resistance to moisture, ozone, heat (up to 80C),

NEOPRENE JACKET. Here is real flexibility and great strength engineered for this specific tough use. Handles well, has high impact resistance and lasts longer in all weather.

RUBBER-CORED GROUND WIRES. This safety-first feature prevents kinking, gives greater shield contact, and cushions the wires.

COPPER-COTTON SHIELD. Special new-type shield makes splicing easier, faster without damage to insulation. Eliminates chafing failures.

Ask your Anaconda Sales Office or Distributor to show you this and other ANACONDA portable mining cables. Learn how continuous improvements have made these famous cables better . . . for safety . . . and for increased production at less cost in your mine. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.



the right cable for the job ANACONDA wire and cable

ROCK PRODUCTS, April, 1953

#### Your equipment gets



# TOUGH

when you install

# J&L JALLOY HEAT-TREATED PLATE

for impact and abrasion resistance on equipment like this

J&L Jalloy Heat-Treated Plate—the mining and quarrying steel—can help you cut maintenance costs, increase the service life of equipment that takes a real beating from severe impact and abrasion.

Here's why—heat-treated Jalloy was developed by J&L specifically for heavy duty applications such as those encountered in the mining and quarrying field. It's a heat-treated, fine-grain, manganese molybdenum steel with both yield strength and Brinell hardness 4 times as great as mild steel. The result—J&L heat-treated Jalloy lasts 4 times as long as mild steel yet costs only twice as much.

It's easy to see why more and more progressive equipment owners have turned to J&L heat-treated Jalloy to do a dollar-saving job for them. If you're responsible for the economical operation of earth moving or handling equipment you'll want complete information on this modern mining and quarrying steel. Just fill in the coupon for a free copy of our Jalloy Booklet—"For Longer Wear... Less Repair."

#### JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGE

Jones & Laughlin Steel Corporation 481 Liberty Avenue Pittsburgh 30, Pennsylvania	
☐ Please send me a free copy of your Wear Less Repair." ☐ Please have your representative call.	booklet-"For Longer
Name	Tide
Name	Tide



# MAKE NO MISTAKE . . . Jaeger gives you most air per dollar any way you figure

- 1. Compare your purchase cost: In every case, the price of your "new standard" Jaeger Compressor is lower than those asked even for out-dated "old standard" machines.
- 2. Compare your cost per cubic foot of air: Your "new standard" Jaeger, although it costs you less to buy, delivers 15% to 25% more cubic feet

of air per minute, at full 100 lb. pressure.

3. Compare your job costs: 15% to 25% more air means 90 to 100 lbs. pressure behind a full set of air tools instead of mere 70 lbs. pressure. This full pressure greatly increases their speed and impact, actually produces 30% to 40% more work with the same men and tools.



Model 175:—First compressor to run a heavy duty breaker efficiently.

Model 125:—First compressor to run 2 heavy duty breakers or
one heavy rock drill efficiently.



Model 185:—First to run 3 heavy duty breakers efficiently.

Model 250:—First compressor to run 3½" wagon drill, 2 heavy rock drills or 4 heavy breakers efficiently.



Model 365:—First to run a 4" wagon drill with air to spare for plug hole drilling, or large Ka-Mo earth drill efficiently.



Model 600:—First to run 2 heavy wagon drills or a big 9B 3 pile hammer efficiently. First "new standard" copied by the industry.

#### No other compressor, at any price, gives you these "air plus" features

- Balanced 2-stage, W-type compressor unit standard in every size from 75 to 600 ft. Cooler and smoother running than any V-type.
- 75% to 100% larger valves for free air flow, and up to 10 times longer valve life.
- Larger intercoolers and air receivers to cool and handle 15% to 25% more air.
- Relief valve for automatic drainage to insure drier, cleaner air, standard on all models.
- Positive lubrication by gear driven oil pump with flooded suction, standard on all models.
- Automatic "Fuel Miser" is standard on all Jaeger models where the automatic control of engine speeds effects worthwhile fuel savings.
- Bigger multiplate clutches than other compressors and bigger engines operating at conservative speeds.

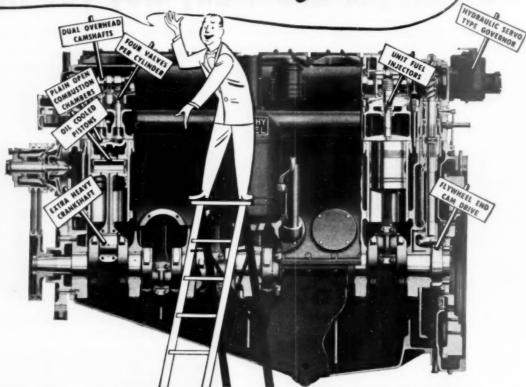
For full details about compressors, tools and their air requirements ask your Jaeger distributor or send for Catalog IC-1.

#### THE JAEGER MACHINE COMPANY

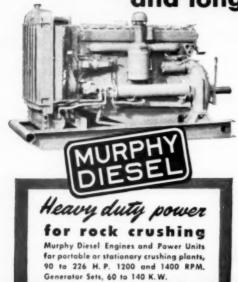
603 Dublin Ave., Columbus 16, Ohio

AGGREGATE SPREADERS . CONCRETE SPREADERS AND FINISHERS . CONCRETE MIXERS . TRUCK MIXERS . PUMPS

Look inside the engine ...



and you'll see why MURPHY DIESEL gives you more power, greater economy and longer engine life...



FOR the most part, engines look pretty much alike from the outside, but to really judge an engine you have to look inside. The Murphy Diesel isn't afraid of comparison. It offers a combination of proved design advantages available in no other engine. Check these features for yourself and ask Murphy Diesel owners—they'll tell you what these features mean in terms of good heavy-duty power, minimum fuel consumption and long engine life.

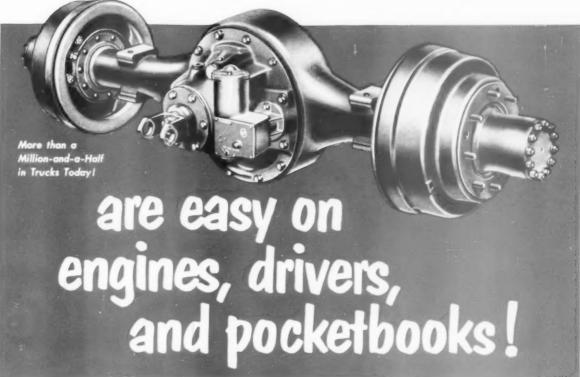
Additional information is given in the booklet, "10 Questions to Ask a Diesel Engine Salesman". Ask your Murphy Diesel Dealer for a copy or write direct.

#### MURPHY DIESEL COMPANY

5315 W. Burnham St., Milwaukee 14, Wisconsin Tulsa Office—Sales, Parts and Service: 113-117 South Elwood Street, Tulsa, Oklahoma Sales, Parts, Service

# Eaton 2-Speed Axle Trucks





The right gear ratio for every situation means engines operate in their lowest-cost speed range. Easy shifting, greater maneuverability, faster get-away with Eaton 2-Speeds—reduce driver fatigue. Quicker full-load trips, longer truck life, less maintenance—mean minimum hauling costs. Have your truck dealer prove it.

EATON

- AXLE DIVISION

MANUFACTURING COMPANY

CLEVELAND, OHIO

PRODUCTS: Sodium Cooled, Poppet, and Free Valves . Tappets . Hydraulic Valve Lifters . Valve Seat Inserts . Jet Engine Parts . Rotor Pumps . Motor Truck Axles . Permanent Mold Gray Iron Castings . Heater Defroster Units . Snap Rings Springtites . Spring Washers . Cold Drawn Steel . Stampings . Leaf and Coil Springs . Dynamatic Drives, Brakes, Dynamometers



#### First of a Series of Dynamatic Kiln-Drive Applications

Dynamatic eddy current rotating apparatus has been used for many years in a wide range of industries for better speed control, quality control, and minimum operating costs.

The Dynamatic installation at the new Penn-Dixie Cement Plant at Kingsport, Tennessee, is the first of a number of recent kiln installations for the production of lime, phosphate, and cement.

In the Penn-Dixie installation, a Dynamatic model 10W liquid cooled coupling driven from a 350 H.P., 514 R.P.M. synchronous motor, drives the induced

draft fan to handle all the air through the kiln. A model 8W liquid cooled coupling is used for the main kiln drive and is driven by a 200 H.P., 1200 R.P.M. cage motor. Small Dynamatic air cooled couplings are used on the synchronized slurry feed drive, the cooler drive, and the coal feeder drive.

The large liquid cooled couplings and all auxiliary drives are simultaneously controlled by heavy duty dust-tight industrial electronic controls arranged with automatic transfer switches to insure continuous operation.

Send for your copy of Bulletin GB-1, which illustrates and describes these and other applications.



#### CORPORATION .

K E N O S H A WISCONSIN

Subsidiary of EATON MANUFACTURING COMPANY, Cleveland, Ohio

Dynamometers
Ajusto-Spedes

Oil Well Drawworks Brakes

Adjustable-Speed Couplings

**Eddy-Current Brakes** 

s o Shovel Clutches

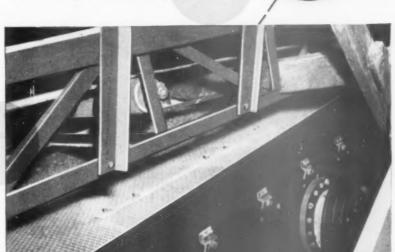
Press Drives

Lift Truck Clutches

Electronic Controls

# bouncing rubber balls

help speed production of agricultural limestone at Krueger Quarry



On the Ball Tray Deck of this 4' x 12' Deuble Deck SIMPLICITY Screen at the Krueger Quarry in Winchester, Illinois, bouncing rubber balls team up with SIMPLICITY's unique gyrating action to produce agricultural limestone at the rate of 60 tons per hour. Production goes along without interruption because the lively rubber balls, bouncing in compartments on the lower deck, prevent build-up of the soft limestone and keep it from blinding the 5/32" screen even when the material is damp.

SIMPLICITY Ball Tray Deck Screens like this one at the Krueger Quarry can do a better job of processing damp, sticky material for you. Other SIMPLICITY Screens with single, double or triple decks can help speed production and cut the costs of all your screening operations. For complete information, consult a SIMPLICITY sales engineer or write us today.

123

Sales representatives in all parts of the U.S.A.

FOR CANADA: Canadian Bridge Engineering Co., Ltd., Walkerville, Ontario

FOR EXPORT: Brown and Sites, 50 Church Street, New York 7, N. Y. implicity MARK REGISTERED

ENGINEERING COMPANY . DURAND, MICHIGAN

# Having trouble with this tough trio?



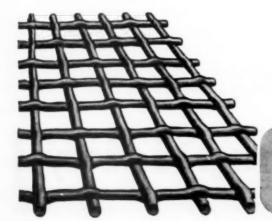
# switch to SUPER-TEMPERED PRECISION SPACE SCREENS

Abrasion . . . Vibration . . . Fatigue! Here's a trio of trouble-makers that can play hob with your production schedules when they team up against ordinary screens. Want to make 'em yell quits? Just install SuperTempered Precision Space Screens and find out what extra durability and tightness can mean to you in less downtime, longer, more accurate service, greater tonnage output at lower cost. And here's why:

- · Hard and tough steel
- · Precision crimping
- · Powerful looming

To order, write or phone our nearest district sales office.

THE COLORADO FUEL AND IRON CORPORATION—Denver, Colorado
THE CALIFORNIA WIRE CLOTH CORPORATION—Oakland, California
WICKWIRE SPENCER STEEL DIVISION—Atlanta, Boston, Buffolo, Chicago, Detroit,
New York, Philadelphia



# SUPER-TEMPERED PRECISION SPACE SCREENS

PRODUCT OF WICKWIRE SPENCER STEEL DIVISION THE COLORADO FUEL AND IRON CORPORATION





supplying air to two wagon drills in a quarry



operating backfill tampers on a highway construction job.



O-FLO supplying air to paving breakers on street repair work.



powering two wagon drills on a canal

### here's why GYRO-FLO Rotary Compressors are first choice in Portable Air Power . . .

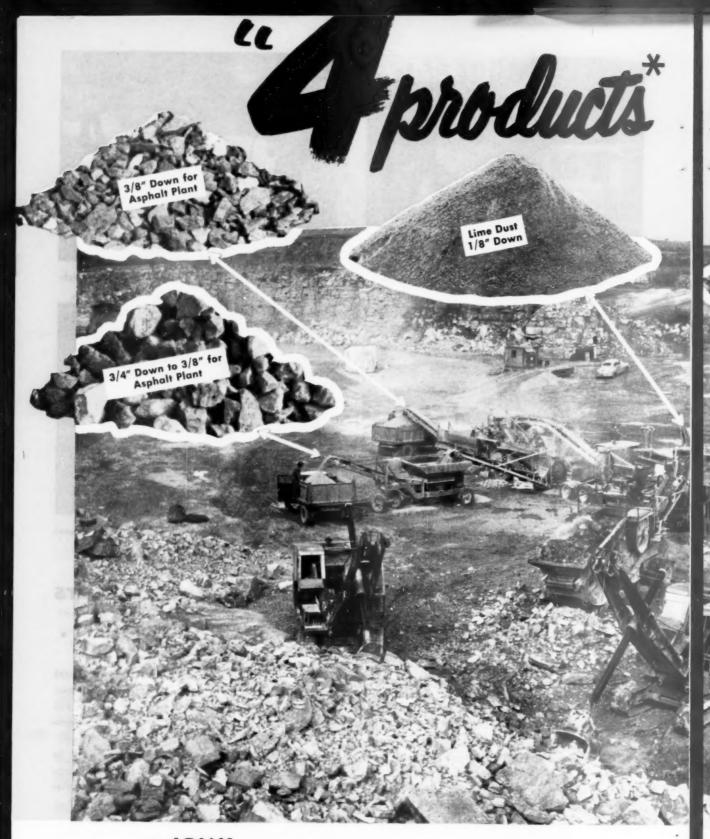
GYRO-FLO Portables are at the top of the list with hundreds of contractors because there are no valves to leak . . . no pistons, rods or clutch to wear. Discharge temperatures of less than 200°F mean longer hose life. "Air-Glide" capacity control takes the strain off engines by providing stepless regulation of engine speed and compressor output from 0 to 100%. The compressor is really matched to the higher speeds of GM diesels and Continental gasoline engines.

All four GYRO-FLO sizes, 105, 210, 315 and 600 cfm, have been proven on the toughest jobs all over the country. In blistering heat or bitter cold, at sea level or high altitudes GYRO-FLO Rotary Compressors have met every test.

The GYRO-FLO is smaller, simpler, lighter in weight and easier to maintain than any portable compressor ever built before. Your nearest I-R representative will be glad to give you the full story.

Part of the

ONTRACTORS' OMBINATION . .



THE IOWA LINE of Material Handling Equipment Includes: ROCK AND GRAVEL CRUSHERS •

BELT CONVEYORS • STEEL BINS • VIBRATOR AND REVOLVING SCREENS • UNITIZED ROCK AND GRAVEL PLANTS
• FEEDERS • PORTABLE POWER CONVEYORS • PORTABLE AND STATIONARY STONE, GRAVEL AND SAND PLANTS •

REDUCTION CRUSHERS • BATCH TYPE AND VOLUMETRIC TYPE ASPHALT PLANTS • DRIERS • DUST COLLECTORS

HAMMERMILLS • WASHING PLANTS • VIBRATING SOIL COMPACTION UNITS • DOUBLE IMPELLER IMPACT BREAKERS

# at a time



\* AGRICULTURAL LIME from 1/8" down

\* 3/4" minus CLASS A ROAD ROCK

\* 3/8" minus AGGREGATE

\* 3/8" to 3/4" AGGREGATE in one operation with this

Cedarapids UNITIZED PLANT

HERE'S a Cedarapids Unitized Plant which turns out 210 tons per hour of four different products for a large Midwestern producer! The heart of the plant is a Portable Hammermill Secondary (shown at the left directly under the pile of lime dust) where a 4033 Cedarapids Hammermill handles all the final reduc-



Sectional view of Cedarapids hammermill showing the exclusive features which assure big volume and particle size control - correct location of feed opening, proper angle of breaker plate and the offset swing circle of the hammers in relation to the grate circle.

Cedarapids Hammermills operate on a revolutionary principle which gives the material a combined impact breaking and milling action that results in big capacities of lime dust with the uniformity and fineness so necessary to good agricultural limestone . . . the kind that assures repeat orders. Not only a much finer quality of material is produced, but size for size, Cedarapids Hammermills turn out more tons per hour than other similar types of equipment.

When your job calls for aglime or crushed limestone, or both in one operation, be sure to investigate all the advantages of Cedarapids Hammermills. They are available in 4033, 3033 and 2033 sizes, as individual units, or in portable or stationary plants. Your Cedarapids distributor will gladly help you select the size best suited for your needs. Call him today.

#### MANUFACTURING COMPANY

Cedar Rapids, Iowa, U.S.A.



The Big News is Hercules!

# NEW "TELESCOPIC HOIST" TRAILERS ADD UP TO 2000 LBS. PLUS TO YOUR LEGAL PAYLOAD!

# Lighter, Heavy-duty Construction With Best Weight Distribution

New Hercules Twin Telescopic Hoists eliminate a lot of deadweight from the trailer because they lift over the fifth wheel, letting the truck-tractor help support the dumping operation. Lifting capacity is greater too, and loads are hoisted with considerably lower oil pressure than normally required.

Don't haul iron in your gravel, sand or coal payload. Hoist, body, and trailer are each designed for more strength with less weight, and for record-breaking performance when the three are combined as a unit in heaviest duty service. These trailer packages are available in standard 20 ft.—20 yd. tandem axle models, other lengths and carrequest.

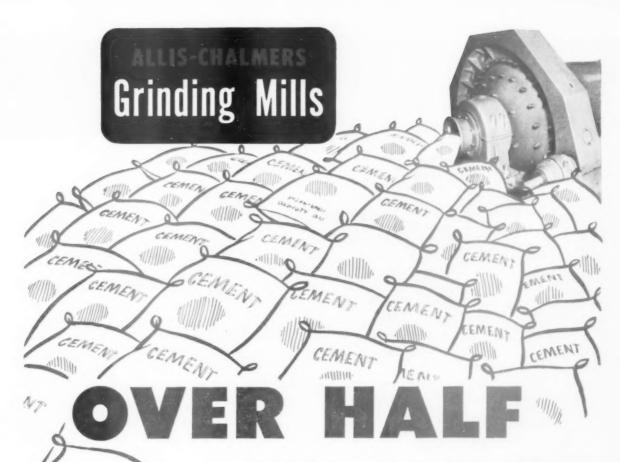


Ask your nearby Hercules Distributor, or write the factory direct, for complete information on the new Telescopics. They're just one of the many reasons why users of truck, tractor, spreader, and contractor's equipment everywhere are saying—THE BIG NEWS IS HERCULES ment everywhere are saying—THE BIG NEWS IS HERCULES



**Profitable Distributor Franchises** for various types of Hercules equipment are available in some areas. Investigate now.

HERCULES STEEL PRODUCTS CORPORATION . GALION, OHIO



#### of all Cement produced in the U.S. is Ground in Allis-Chalmers Grinding Mills!

EMENT PRODUCERS specify Allis-Chalmers grinding mills because they have proved so profitable on the job. In fact, 7 out of 10 A-C mills sold today are repeat orders!

When you specify Allis-Chalmers grinding mills you profit by A-C's unsurpassed experience, engineering, testing, erection and parts service. You can be sure of getting the right size and type mill for your job. A-C has built over 4300 grinding mills covering every type of application.

Get more facts from the A-C representative in your area. And write Allis-Chalmers, Milwaukee 1, Wisconsin, for Grinding Mill Bulletin 07B6718A.

## S-CHA

Sales Offices in Principal Cities in the U.S.A. Distributors Throughout the World.

EMENT













A-C builds single and multi-stage grinding mills in a complete range of sizes. Special mill modifications and grinding circuits can be engineered to suit your application.

# INSURE



122, 186, 275-325, 450 h.p....
speeds from 28 to 40 m.p.h. Power
steer . . . 90° turns . . . powerproportioning differential . . multiple-disc air brakes . . constantmesh or sliding-gear transmission
. . torque converter optional on
186 to 450 h.p. units.

Note: LeTourneau also makes Tournatractor, a 4-wheel primemover on rubber with similar versatility.

#### FOR SHOVEL LOADING

#### FOR BOTTOM-DUMP HAUL



#### 9 to 50-ton Tournarocker\*

For hauling everburden, rock or ore, this highly-maneuverable Rear-Dump can't be beat. Unit turns around in less than own length, spots quickly. Wide bowl provides big target for shovel operator, reduces spillage, saves shovel swings. With front-wheel drive and independently operated rear-wheel brakes, rig backs to edge... dumps well over bank to eliminate rehandling...pulls away safely from soft edge. Triple-reinforced, all-steel bowl withstands heavy use. Induction body heating available for cald-weather operations.



#### 18 to 50-ton Tournahopper

Clamshell doors of Tournahopper open wide for fast, clean dump of even the stickiest material. As bottom swings clear under full power, it wipes clean against hopper sides. Bottom opening is same size as top to clear boulders, stumps. No dangling gates. Square type bowl makes easy shovel or clamshell target, speeds loading. Big low-pressure tires, power-proportioning differential (which automatically allocates most power to drive wheel on firmest footing) give high flotation and positive traction in soft material.



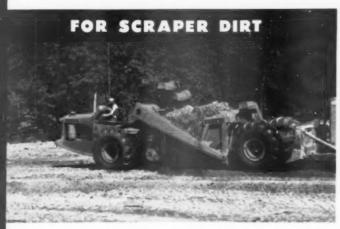
R. G. LeTOURNEAU, INC.

# YOUR FUTURE

## Cut costs on <u>more</u> pit operations with LeTourneau interchangeability

In stripping overburden, excavating and pit hauling, you can substantially lower your investment with high-speed, convertible LeTourneau equipment. To best fit your job conditions, LeTourneau offers you a choice of 4 two-wheel prime-movers, 122 to 450 h.p., with speeds up to 40 m.p.h. Each prime-mover powers from 3 to 5 interchangeable trailing units. Interchangeable haul units can be purchased any time. Wheels, tires, and brakes of trailing units are interchangeable, therefore, cost of an additional haul unit is only about 25%

of the total initial cost of prime-mover and original haul unit. Whenever and wherever the need develops, a relatively small investment equips you to handle efficiently any specialized hauling, excavating, or lifting operation. Investigate the LeTourneau unit that fits your present equipment needs. Remember that with LeTourneau's wide range of applications, you always have a better opportunity for continuous equipment earnings, not only in your own pit, but through subcontracts, rentals or resale.



#### 7 to 42-yd. Tournapull

With scraper coupled to your prime-mover, you can strip overburden, move spoil banks, build and surface houl roads. Big low-pressure tires assure ample flotation in mud, sand and snow. Constant-pull, power-proportioning differential also reduces weather delays... gives positive traction on soft banks and slick pit grades... keeps your prime-mover working and earning all year 'round. Change from one hauled unit to another takes only a few hours. All units electrically controlled:... use same wheels, tires, and brakes.

\* Trademark Reg. U. S. Pat. Off \*\* Trademark G-108-G



#### 10 to 50-ton Flat-Bed

Tournahauler has plenty of power and traction for rough aff-road hauling . . . can self-load and unload by means of optional traveling overhead electric hoist.

#### 10 to 40-ton Crane

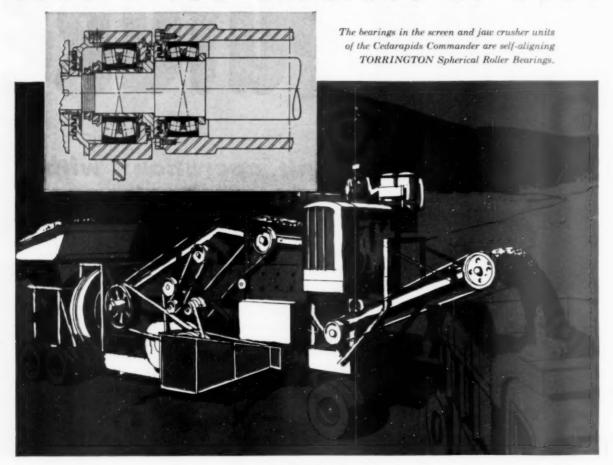
Works in buildings, on pavement, in mud, sand, or snow. Carries full load anywhere at high speeds . . . reaches through deerways, arches.



Peoria, Illinois

See your LeTourneau Distributor

NOW for all the facts



# Capacity up!

TORRINGTON Spherical Roller Bearings contribute greatly to the outstanding performance of the Iowa Manufacturing Company's Cedarapids Commander unit. They enable this portable crushing and screening plant to keep "capaci

ing and screening plant to keep "capacity up and operating costs down".

The bearings are manufactured from bearingquality electric-furnace alloy steels. The landriding cages are machined from solid cast-bronze



## Cost down!

rings. The accurate geometrical conformity of rollers and races provides capacity for heavy radial and thrust loads.

That's why major equipment manufacturers specify TORRINGTON Bearings for crushers, vibrating screens, hammermills and pulverizers.

Use the best-specify TORRINGTON.

## TORRINGTON SPHERICAL BEARINGS

Spherical Roller • Tapered Roller • Straight Roller • Needle • Ball • Needle Rollers



#### How do you measure the look in a puppy's eye?

The preliminary precautions have been taken. A well-recommended kennel. A healthy litter. A breed that takes well to youngsters.

Now it's up to the boy to choose.

How will he decide? Perhaps by the look in a puppy's eye.

Chances are, you'll be buying Multiwalls soon again. You've done as every good buyer does. You've considered the reputation of the various suppliers. You've investigated the quality of their product. You've set down your specifications to the last fraction.

Now you pause to think again of the fellow who will make the final choice—your customer. How will he decide? One consideration may well be "the look in a puppy's eye." To say it another way, the sales appeal of your package.

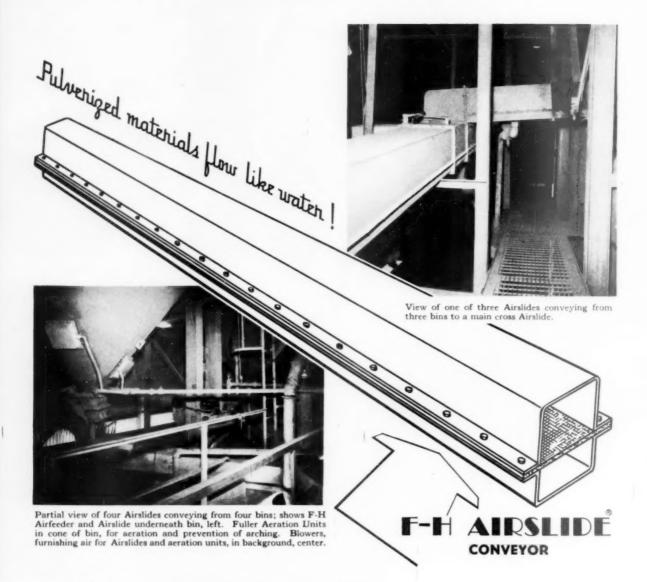
Men who know Multiwalls ... who buy more than 85 per cent of all Multiwalls made ... give great weight\* to good printing and design.

Union's art directors have concentrated experience. They know how to give your Multiwall package the look it needs to stand out among competition. Volume purchasers of Multiwalls recognize this, They are calling on Union for a greater share of their Multiwall needs.

More so every day . . .

#### IT'S UNION FOR MULTIWALLS





For sheer simplicity, low-maintenance costs and ease of operation, the F-H Airslide Conveyor is just about tops. In this system, dry, fine materials like gypsum, soda ash, fly ash, cement, barytes, flour, alumina, silica, talc, resins, detergents and soap powders are aerated and made to flow like water. Low-pressure air is dispersed through the material from a porous medium so that each particle is enveloped in air, thus reducing the interparticle friction and the angle of repose. Hence the material flows.

Think what this means to you? Because the system is completely enclosed, danger of contamination is

removed . . . dusting eliminated. No moving parts, consequently repairs and costly down-time is at the minimum. Easily erected, a space-saver, the Airslide permits economy and convenience in location without the restrictions or straight-line limitations of mechanical conveyors.

Why not have a Fuller engineer show you how the Airslide can help cut your conveying costs . . . modernize your present plant equipment, or plan an entirely new system. Chances are he can show you how a minimum expenditure can bring you a conveying system that means low cost, reliable operation.

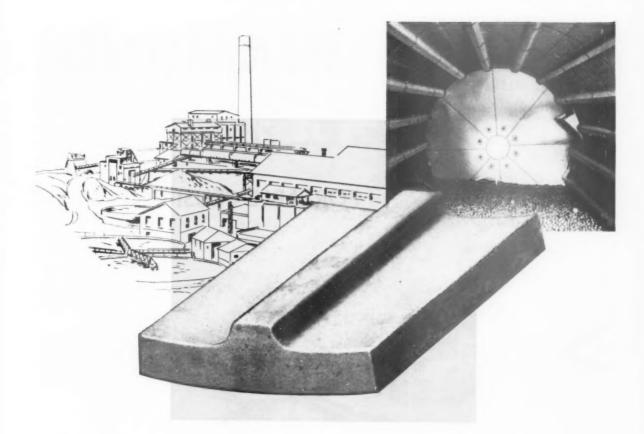
Fuller

DRY MATERIAL CONVEYING SYSTEMS AND COOLERS - COMPRESSORS AND VACUUM PUMPS - FEEDERS AND ASSOCIATED EQUIPMENT

FULLER COMPANY, Catasauqua, Pa. Chicago 3—120 So. LaSalle St. San Francisco 4—420 Chancery Bldg.

Fuller Company is the exclusive manufacturer of air gravity conveyors, except for use in motor vehicles, under Huron Portland Cement Company U. S. Patent Nos. 2,316,814, 2,517,837, 2,527,394, 2,527,455, 2,527,466, 2,527,488 and Patents Pending.

FH-28



### this LINER boosted production 35%

AMSCO Ball Mill Liners
Reduced Down-Time, Increased Production...

A large West Coast cement producer found that Ball Mill Liners were causing expensive trouble. Liners were thick—over 3 inches. This meant reduction in mill capacity. Thick liners also meant tremendous weight. Both thickness and weight reduced production and efficiency. Liners wore rapidly, too, causing frequent, expensive replacement jobs, with costly labor and material. And added to the bill was lost production due to mill down-time.

Well-known for their skill in handling impact and abrasion-resistant alloys, AMSCO engineers and foundrymen were consulted.

AMSCO solved the Ball Mill Liner problem.

AMSCO designed a new, light, thin-1 inch thick—liner, which because of lightness and thinness increased mill capacity, heightened efficiency. The new liners lasted beyond all expectations and in addition the segments were easier to install. These factors, plus reduced replacement down-time, have been responsible for a 35% increase in production.

AMSCO is the largest producer of Manganese Steel, "the toughest steel known," which has proven itself under countless abrasion and impact situations. And where the service conditions require it, AMSCO also produces Chromium-Molybdenum and Chrome-Manganese alloys.

If you have a tough wear problem and suspect that there may be a better alloy for your purpose, you are invited to write to AMSCO for further information.



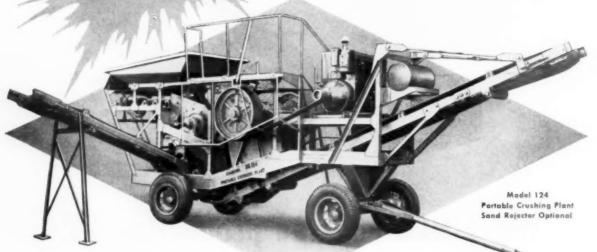
AMERICAN MANGANESE STEEL DIVISION

Other Plants: New Castle, Del., Denver, Oakland, Cal., Los Angeles, St. Louis. In Canada: Joliette Steel Division, Joliette, Que.

Amsco Welding Products distributed in Canada by Canadian Liquid Air Co., Ltd.

ANNOUNCING NEW MODELS
IN THE
100 SERIES DIAMOND

PORTABLE CRUSHING PLANTS



#### 3 MODELS... capacities from 30 to 70 tons/hr.



Designed for frequent moving, quick set-up and knock-down to give you more efficient crushing where you want it-when you want it. Ideal for counties and townships, secondary and access road construction, and areas where a high degree of mobility is needed. Low hopper height (10' 4½") gives ease of loading with ½ or ½ cu. yd. shovel. Heavy Duty Grizzly openings give higher crusher production with minimum of scalping. Location of wheel bar tongue and short wheel base

provides needed maneuverability on road or in pit. Hinged delivery conveyor eliminates dis-mantling for towing. Mechanical or air brakes and fully guarded drives mean added safety. Adjustable single eccentric plate feeder provides a constant, even flow of pit run material.

Completely modern in every way, the Diamond

Portable Crushing Plant is your answer to more efficient crushing.

#### **OUTSTANDING FEATURES**

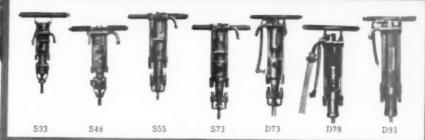
- 1. Highly portable
- 2. Controls centrally located
- 3. Low loading height
- 4. Low traveling height
- 5. Light in weight
- 6. Heavy in production
- 7. Clutch operated feeder
- 8. Oversized vibrating screen
- 9. Sand rejector (optional)
- 10. Power unit plant mounted

Get the facts and specifications that tell you how a Diamond Portable Crushing Plant will increase your production. Send for new Single Pass Gravel Plant Bulletin 1000.



for any
rock formation...





drilling, hard-hitting Gardner - Denver Sinkers is just right. Bulletin HHD-11 tells all about 'em. Write for your copy today.



An LO12 Line Oiler in the line keeps your rock drills oiled — automatically.

#### GARDNER-DENVER Since 1859

Gardner-Denver Company, Quincy, Illinois In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Ave., Toronto 13, Ontario

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS

ROCK PRODUCTS, April, 1953

for

STRENGTH

EASY HANDLING AND FILLING

SHARP, CLEAR BRAND PRINTING



CHASE Multiwall Bags



especially designed

for the packaging, shipping

and storage of Rock Products



CHASE BAG COMPANY

GENERAL SALES OFFICES 309 W. JACKSON BOULEVARD CHICAGO 6, ILLINOIS

30 BRANCHES AND SALES OFFICES STRATEGICALLY LOCATE

ROCK PRODUCTS, April, 1953



# How **BIG** Is a 21/2-Yard Rig?

Bigger than you think, unless you know the MARION 93-M. Genuine "bigness" in a shovel, dragline, clamshell or crone is a blend of many features. The MARION 93-M has them all.

Crowd the dipper into rock, ore or shale. Feed it the hoist power — all it has. Watch the 93-M show its muscle and deliver real hoist speed and power without flinching. In heavy loads, there's reserve strength for every digging need.

Such performance qualities give an operator confidence as he proceeds in tough digging. The combination of speed and power in hoisting, digging and swinging lets him get things done in a hurry. Fingertip ability to spot the dipper keeps him fresh on the job. His machine's sheer strength and power keep things moving dependably at a fast pace, year after year.

Such factors make the 93-M a bigger producer than you might expect from a 2½-yard machine. Proof is yours for the asking, either in performance records of machines in the field or in terms of the engineering and construction features which make such performance possible.

Let us tell you more about this truly BIG 2½-yard MARION.

## MARION

POWER SHOVEL CO



OFFICES AND WAREHOUSES IN ALL PRINCIPAL CITIES

from ¼ cu. yd.



# More of what you want in CHEVROLET Advance-Design Trucks

- and here are 4 powerful reasons why:

NEW ENGINE POWER—TEAMED WITH LOWER COSTS! The improved Loadmaster engine with a new high compression ratio of 7.1 to 1, now delivers even more power. This great engine is standard on 5000 and 6000 Series heavy-duty and forward-control models—optional on 4000 Series heavy-duty models. In light- and medium-duty models the Thriftmaster engine offers traditional Chevrolet economy.

NEW STAYING POWER—FOR GREATER DURABILITY! Frames are heavier, stronger, more durable in all 1953 Chevrolet trucks. You'll find greater ruggedness and stamina. You'll find these trucks even brawnier and sturdier than Chevrolet trucks in past years—trucks that have long been famous for those very qualities. And this heavier construction brings new comfort and freedom from fatigue to drivers, too.

NEW BRAKING POWER—FOR QUICKER, SURER, SAFER STOPS! Two types of brakes on 1953 Chevrolet advance-design trucks provide greater stopping power and greater durability. "Torque-Action" brakes are standard front and rear on all trucks up to 4000 Series heavy-duty models. Extra-large "Torque-Action" brakes in front, "Twin-Action" type in rear are on Series 4000, 5000 and 6000 heavy-duty models.

NEW ECONOMY—LOWERS COST OF EVERY TON-MILE HAULED! Expect greater economy with Chevrolet trucks. New and greater stamina with extra gasoline economy cuts operating costs, maintenance costs in heavy-duty models with Loadmaster engine. And these great trucks list for less than comparable models of any other make! Chevrolet Division of General Motors, Detroit 2, Mich.

#### CHEVROLET ADVANCE-DESIGN TRUCK FEATURES

TWO GREAT VALVE-IN-HEAD ENGINESthe Loadmaster or the Thriftmaster - to give you greater power per gallon, lower cost per load. POWER-JET CARBURETORfor smooth, quick acceleration response. DIAPHRAGM SPRING CLUTCH - for easyaction engagement. SYNCHRO-MESH TRANSMISSION - for fast, smooth shifting. HYPOID REAR AXLE-for dependability and long life. TORQUE-ACTION BRAKES-on light-duty and medium-duty models and on front of heavy-duty models. TWIN-ACTION REAR BRAKES-on heavy-duty models. DUAL-SHOE PARKING BRAKE-for greater holding ability on heavy-duty models. CAB SEAT - with double deck springs for complete riding comfort. VENTI-PANES - for improved cab ventilation. WIDE-BASE WHEELS - for increased tire mileage. BALL-GEAR STEERING - for easier handling. UNIT-DESIGNED BODIES for greater load protection. ADVANCE-DESIGN STYLING-for increased comfort and modern appearance.



# Look for These 6 Signs of Good Motor Design

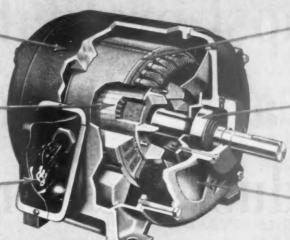
FRAME — Rigid cost iron. Designed to hold bearing alignment, resist corresion, prevent distortion under any normal operating condition.

2

ROTOR — Die cast aluminum for maximum strength, Practically indestructible in service.

3

conduit BOX — Provides plenty of room to connect leads. Adjustable to any position, long leads make connection easy.



STATOR — Multiple-dipped, baked after every dip. Builds up tough protection against heat, moisture, corrosion.

5

BEARINGS — Double shielded with provision for in-service lubrication if desired. Will run for long periods without attention but can be greased if conditions demand it. Thereughly protected against outside dirt.

6

VENTILATION — Drip-proof with planty of internal air circulation to prevent het spots.

# Get Allis Chalmers Motors for these Extra Values!

Certified Service — Nearly 100 Allis-Chalmers Certified Service Shops provide factory-approved parts and service on your Allis-Chalmers motors. Screened for modern equipment, adequate experience and business integrity, these independently owned service shops will provide you with prompt, economical repair and maintenance.

Complete Drives from One Source — Allis-Chalmers can supply your complete drive — motor, control and *Texrope* V-belt drive — from one convenient, reliable source.

Application Engineering — Your Allis-Chalmers District Office representative or Authorized Dealer will be glad to help you select exactly the right motors for your needs. For additional information, write Allis-Chalmers, Milwaukee 1, Wisconsin, for Bulletin 51B6052.

Texrepe is an Allis-Chalmers trademark.

## **ALLIS-CHALMERS**



Sold . . .

Applied . . .

Serviced . . .

by Allis Chalmers Authorized Distributors, Certified Service Shops and Sales Offices throughout the country.



CONTROL — Manual, magnetic and combination starters; push button starters and components for complete control systems.

TEXROPE V-belts in all sizes and sections, standard and Vari-Pitch sheaves, speed



PUMPS — Integral types from ¾ in. to 72 in. discharge and up. Your Management wants to know...

# The most profitable approach to dust recovery

In every industry, from rock products to food to steel, Buell engineers, working with plant engineers, have established an enviable 18-year record of turning unnecessary dust losses into substantial new profits. What's more, Buell Dust Recovery Systems uncover, for all American industry, these additional important advantages: improved product quality, smoother plant-community relations and higher employee morale.

To take advantage of Buell's background and experience in the highly specialized science of dust recovery, ask for further information about Buell's **3 basic systems** of dust collection. See how they can help you turn dust into dollars. Send for Buell's new, informative bulletin titled, "The Collection and Recovery of Industrial Dusts."

Buell Engineering Co., Dept. 17-D,



VAN TONGEREN CYCLONE



SF' ELECTRIC



PRECIPITATOR --



70 Pine Street, New York 5, New York.

TYPE 'LR'



DUST HOPPER VALVES





ENGINEERED EFFICIENCY IN DUST RECOVERY

# drill holes faster

get greater footage, better fragmentation,
 lower costs

Le Roi-CLEVELAND

T286 Self-Propelled
Dual Drill Rig

It's 2
Le Roi-CLEVELAND
patented air feeds and
drills with air-motor
booms mounted on a
25-hp tractor

3 speeds forward...
1 speed reverse



One Le Roi Airmaster 600 cfm Compressor provides all the low-cost air you need to operate the T286 Dual Drill Rig, when it is equipped with Le Roi-CLEVELAND 4" drifters. A smaller compressor is sufficient, when the T286 is equipped with the 45-lb, H10 or 80-lb, H23 (3½"-bore) sinker drills or 3½"-bore D25 drifter.

WITH a Le Roi-CLEVELAND T286, your man drives where he wants to go — over almost any kind of ground — and tows the compressor right along.

He drills and cleans holes as deep as 30' — in any direction — at any angle — with less air.

Have your nearby Le Roi distributor show you how this all adds up to faster drilling, better hole spacing, greater footage, better fragmentation, lower costs.

Write for Bulletin RD-21.

6 142



LE KOI COMPANY

CLEVELAND ROCK DRILL DIVISION 2500 Berea Road © Cleveland 11, Ohio Plants Milwaukee, Cleveland and Greenwich, Ohio

# HERE'S HOW PRICE BROTHERS CO. HOLD DOWN COSTS ON PRESTRESSED CONCRETE FOR FLORIDA WATER MAIN JOB



GETTING CENTRAL MIX PLANT LOAD OUT OF ERIE PORTABLE UNIT

Job calls for 8 1/2 Miles of Prestressed Concrete Pipe.

This is a GTES 100-yd. combination bin with EWEH 2-yd. AggreMeter, 75 TPH aggregate elevator, 50 TPH cement elevator with supplementary ground storage.



Upper photo shows the complete installation sold by Bode Finn of Dayton, Ohio

#### IT TAKES MORE THAN CAPACITY TO MAKE HIGH STRENGTH CONCRETE INTO 81/2 MILES OF WATER LINE

It takes accurate batch control and fully portable equipment. Price Brothers Co. of Dayton, Ohio, are getting both in their Erie Portable unit on location near Miami, Florida.

Using a formula of Oolite rock, lake sand and liquid admixture, the plant you see in the photo turns

liquid admixture, the plant you see in the photo turns out a batch of high strength concrete every 7 minutes. Said Mr. Harry S. Price, Jr., Vice President, "We bought our first piece of Erie equipment back in 1925, and we're still using it. I am happy to say that our experience with Erie Portable on the Miami job is completely satisfactory."

Erie installations are engineered to do the tough jobs. That's why they work better...longer. When you consider batching and mixing equipment be sure to get the Erie story. You'll be glad that you did.

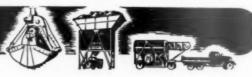
Cobie Address: OPARD

Phone or write for Booklet GS, Dept. P43

STEEL CONSTRUCTION

COMPANY

3811 GEIST ROAD . ERIE, PENNSYLVANIA





#### **GREATEST FORD TRUCKS EVER BUILT!**

For faster handling on any job, Ford Trucks have new, shorter turning. New, wide-track, setback front axle provides sharper turning angle-easier maneuvering and parking.



Fifty Years Forward



# Completely New for '53 FORD ECONOMY TRUCKS

#### NEW TIMESAVING FEATURES **GET JOBS DONE FAST!**

Ford Economy Trucks for '53 are completely new from the tires up! New cabs, new chassis, new power, new transmissions . . . every inch specifically designed to provide fast, economical transportation. New Ford Truck timesaving features GET JOBS DONE FAST . . . at still lower cost per mile!

#### NEW "DRIVERIZED" CABS cut driver fatique!



New one-piece curved windshield, 55% bigger! Wider seat, with new shock absorber. Larger door opening, pushbutton handles.

#### **NEW LOW-FRICTION POWER!**

Choice of 5 engines . . . V-8 or Six!



Overhead valve, 101-h.p. Cost Clipper Six, 145- and 155-h.p. Cargo King V-8's-cut down on friction power waste, save gasoline. Also, 106-h.p. Truck V-8 and 112-h.p. Big Six,

#### **NEW TRANSMISSIONS...** widest choice in truck history!



Synchro-Silent transmission on all models at no extra cost. Steering post shift on 3-speed transmissions. New Fordomatic Drive or Overdrive now available on all 1/2 tonners at extra cost.

#### 4 COMPLETELY NEW LINES over 190 completely new models!

9 Conventional F-Series. Up to 27,000 lbs. G.V.W.; 55,000 lbs. G.C.W. Pickup, Panel, Express, Stake bodies. 4 Cab Forward C-Series. Up to 23,000 lbs. G.V.W. Up to 48,000 G.C.W. 2 Parcel Delivery P-Series. Bodies up to 12½ ft. Up to 14,000 lbs. G.V.W. 4 School Bus B-Series. For up to 60pass, bodies. Up to 20,000 lbs. G.V.W.

#### FREE! MAIL THIS COUPON NOW!

FORD Division of FORD MOTOR COMPANY P.O. Box 658, Dearborn, Michigan Please send me without charge or obligation, com-plete details on new Ford *Economy* Trucks for '53' FULL LINE [] HEAVY-DUTY MODELS [ LIGHT MODELS BIG JOB MODELS [7]

PARCEL DELI	VERY	CAB FORWARD MODELS
Name		
	PLEAS	E PRINT PLAINLY)
Address		
City		State
T-13		Check here if student



Hudson foresters choose a stand of prime timber for multiwall Kraft from Hudson's 435,000 acres. They practice selective harvesting, always leaving parent trees to help with the new crop, by natural reseeding.



Careful selection of trees for mechanized cutting gives uniform quality and dependable supplies of raw materials for pulp making.



Every year about 1½ million southern pine seedlings are planted on Hudson tree farms.

#### Here is why HUDSON can guarantee Multiwall Sacks against breaking on the packer

REASON NUMBER

HUDSON GROWS ITS OWN TREES

Tree farming is big business with Hudson. Every month the company's Palatka, Florida, mill converts 620 freight carloads, 2,515 truck loads, and 10 barge loads of company-grown pine into long-fiber Kraft.

By growing its own trees, Hudson can exert iron-clad control of Multiwall Sack quality and delivery schedules. This is one reason why Hudson can guarantee to replace without cost all Hudson Multiwall Sacks that fail on your packing or closing machines.



# WELTWALL SACKS

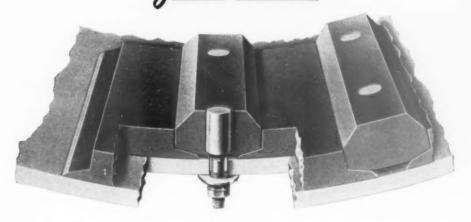
#### Send for these 3 helpful folders:

"Avoid Breakage," "Dependable Source of Supply," and latest issue of "Sack Sense." Also full details on Hudson's unusual Replacement Guarantee.

No obligation.

HUDSON PULP & PAPER CORP.,
Dept. 115, 505 Park Ave., New York 22, N.Y.

# When you install U·S·S LORAIN ROLLED PLATE LININGS you save



Save on installation time and labor. Lorain Liner Plates are made to accurate size and in easily-handled sections . . . can be installed quickly and easily.

Save valuable grinding space. Because of the strength and resistance to breakage of the rolled steel from which U'S'S Lorain Rolled Plate Linings are made, plates of reduced thickness can be used, thereby increasing the usable diameter of the mill . . . boosting output.

Save on "time out" for repairs. Close fits between ends of plates and between plates and lift bars of U·S·S Lorain Rolled Plate Linings eliminate shell wash and allied

troubles which result eventually in costly mill repairs.

Save on replacement materials. Lorain Liner Plates are so rugged they'll wear 'til they're paper thin without failing! And because the plates are interchangeable, severe localized wear at feed or discharge ends of the mill may be balanced just by reversing the worn plates to the opposite end. You get the full life of your linings when they're U·S·S Lorain Rolled Plate Linings!

There are U·S·S Lorain Rolled Plate Linings to fit any type of mill—for wet grinding or dry. Available through leading mill manufacturers whose names will be furnished upon request.

#### For uniform, efficient grinding action specify U-S-S GRINDING BALLS, too

● For still lower grinding costs and higher grinding efficiency, specify U'S'S Grinding Balls for your mill. They're made to exacting specifications ... are carefully tested from raw materials to finished product to assure surface hardness and maximum hardness penetration. Available in diameters from <sup>1</sup>/<sub>4</sub>" to 5". For further information send for our free booklet on U'S'S Grinding Balls.



United States Steel Corporation Room 2811-J, 525 William Penn Place Pittsburgh 30, Pa

Without obligation on my part, please send me your FREE booklet on U.S.S Grinding Balls.

......

Company

Address

ty

State

UNITED STATES STEEL CORPORATION, PITTSBURGH, PA - COLUMBIA-GENEYA STEEL DIVISION, SAN FRANCISCO TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. - UNITED STATES STEEL EXPORT COMPANY. NEW YORK

U·S·S LORAIN ROLLED PLATE LININGS
AND U·S·S GRINDING BALLS



2-994

UNITED STATES STEEL

# here's muscle to move mountains

# IN 6 YARD BITES!



LIMA TYPE 2400—The largest member of the Lima family is engineered and constructed for heavy duty service with higher dump, greater reach, and faster digging cycle.

EASY INSTANT CONTROL — Smooth, "Precision" air control of travel and operating motions lessens operator fatigue. Anti-friction bearings, reduce power robbing friction and step up efficiency.

BIG YARDAGE PRODUCER— Maximum power and fast digging cycles originate from a husky 12 cylinder Diesel engine of approved make. Equipped with torque converter power take-off. LOW OPERATING COSTS — Truck and rotating bases are integrally cast for extrarigidity and long life. Adjustments rarely needed on full mechanical clutches. Easy maintenance.

Offices in Principal Cities of the World

SHOVELS • CRANES
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BALDWIN-LIMA-HAMILTON CORPORATION
Construction Equipment Division
LIMA, OHIO, U.S.A.

Construction Equipment Division

## These Five **Pulverator Features Help**

# REDUCE AGLIME COSTS



#### 1. SQUARE HIT

A square hit is the most owerful breaking blow, Pulverator immermills are designed to utility this important principle of impact crushing. Feed is hit squarely by flat hammers.

## 2. MULTI

Hammers break und repeated-ly smash the material squarely against involute breakers—resulting in a minimum of wear on breaker plates. Pulverators may be operated with or without grate bars and at various

## 3. HIGH

The multi-impact principle produces more fines ahead of the grate ba section, With more fines passing the grate, you get high production at lower cest. Also - power requirement and maintenance are reduced.

#### 5. RENEWABLE PARTS

Liners, breaker plates, hammers, hamme and individual grate bars can be replaced separately. Hammers and grate bars are reversible.

#### 4. QUALITY **PRODUCT**

Pulverator hammermans break material into a uniformly distributed cubical product. The product analysis can be varied by changing grate bar spacing and operating speed.

## **ALLIS-CHALM**

Sales Offices in Principal Cities in the U.S.A. Distributors Throughout the World.

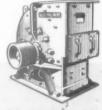












Pulverator hammermills are built in five sizes, capacities 21/2 to 160 tph. Get more facts from the A-C representative in your area, or write for Pulverator Bulletin 0786265A, Allis-Chalmers, Milwaukee 1, Wis.

A-4032

THERMALLOY\*at work...
in the REFRACTORY INDUSTRY



This is the new home of the largest rotary kilns in the refractory industry . . . recently completed by Basic Refractories, Inc., in Maple Grove, Ohio. Measuring 11'3" in diameter by 390' long, each kiln daily processes approximately 2000 tons of granular dolomitic refractories for open-hearth and electric, steel-furnace linings. With continuous operation in this plant,

equipment must give top performance, with minimum down time. Shown below are two important parts in Basic's production equipment . . . both made from high-heat and abrasion-resistant Thermalloy. Their design was achieved by co-operation between Electro-Alloys' and Basic's engineers. The same engineering help is available to you at Electro-Alloys.



Thermalloy Kiln Feed Pipe... The outside shell of the pipe must resist warping at temperatures up to 1700°F. in the dust collector chamber. The interior lining must resist the abrasive action of dolomite tumbling continually into the kiln. Both jobs are successfully done by selected grades of Thermalloy.



Thermalloy Damper... The sectional design of this high heat-resistant Thermalloy damper offers several cost-saving advantages in comparison to heavier refractory dampers formerly used: installation and handling are easier; damper sections can be replaced and repaired faster; draft control can be maintained more effectively.

Put Heat-Resistant Thermalloy to Work in Your Plant . . .

call or write

Reg. U. S. Pat. Off.



**ELECTRO-ALLOYS DIVISION** 

ELYRIA, OHIO

# "Here's one place where it pays to be TIGHT!

"Shooting a blast is like jumping with a parachute . . . everything's got to work right the first time, or else!

"And everything depends on the loading and hook-up. You need *tight* connections all along the line, and you get 'em quickly and easily with Primacord.

"For the trunk line, I use Plain Primacord. It ties easily in knots that don't loosen up.

"That square knot is used above ground, when you want to lengthen the trunk line.

"Just remember to *pull it up tight*. You can, with Primacord."

Ask your explosives supplier or write for further facts to

#### THE ENSIGN-BICKFORD COMPANY

Simsbury, Connecticut Also Safety Fuse Since 1836

#### PLAIN PRIMACORD

is very flexible and light in weight. It has a tough textile cover and can be tied up tight without slipping. Use it as the down line in small bore or shallow holes and as the trunk line to connect all holes.

#### Other PRIMACORD Brands

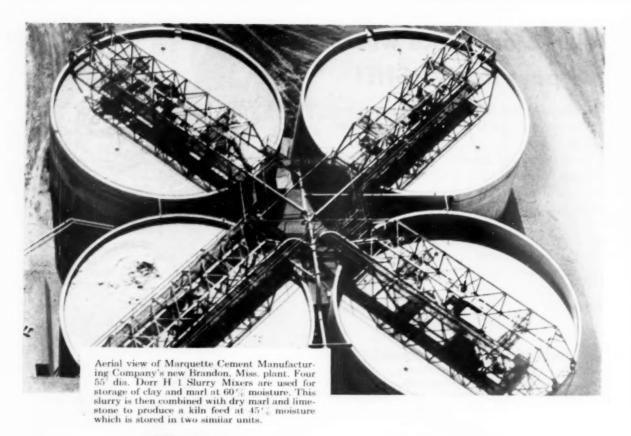
Reinforced — for deep holes and resistance to abrasion

Wire Countered — for deep ragged holes

Plastic Reinforced — for deep holes and unusual wet conditions.

Use PRIMACORD

The PROVED and APPROVED DETONATING FUSE



## for your **BIG** cement slurry storage job...

You can't beat the Dorr Type H Slurry Mixer... today's best answer to the problem of large volume kiln feed storage for wetprocess cement production.

First, it is powered by the Type H drive from which it takes its name...a rugged power-package incorporating balanced spur gears and extra-heavy duty construction.

Second, it utilizes a center shaft mechanism with the drive head supported by a truss spanning the tank. Requires no center pier and foundation...saves concrete and reinforcing steel...greatly sim-

plifies the construction of deep tanks for cement slurry mixing. In short . . . saves dollars for you.

Add to these features the thoroughly proven mixing control effected through the rake and air lift principle of the Dorr Slurry Mixer. The result is the best possible slurry storage unit in the 45′ to 70′ dia. range . . . at a reasonable installed cost. For more detailed information write to The Dorr Company, Stamford, Conn., or in Canada, The Dorr Company, 80 Richmond Street, West, Toronto 1.



THE DORR COMPANY - ENGINEERS - STAMFORD, CONN.



OFF THE ROAD

# GENERALS

ON THE ROAD

Resist cuts, scrapes, bruises... Give more traction! More speed! WORK FASTER ... LAST LONGER ... COST LESS

GENERAL L. C. M. Broad, deep, self-cleaning tread lugs and reinforced shoulders for more traction off-theroad. Longer wear on razor sharp mine and quarry surfaces.

> GENERA L.C.M.

H.C.T.

GENERAL H. C. T. for most work on-theroad, some off. More rubber, more cords per inch for greater safety. Extra traction through sand, gravel, slush, mud.

Make Every Worn Tire Work Longer for More Profit! Your GENERAL TIRE DEALER WILL KRAFT SYSTEM RECAP Worn Tires with the New GENERAL Truck Tire Tread of Your Choice

RECAPPING A GENERAL TIRE SERVICE

You're throwing away money when you throw away worn tires or accept an ordinary "adjustment" for them. Let your General Tire Dealer-a tire expert-restore worn tires with famous factory controlled Kraft System Recapping. You choose from the complete line of on and off-the-road new General Tire treads and he'll put that tread on your worn tire. He can do sectional repairs too. Get Kraft System Recapping-get more profit from every tire.

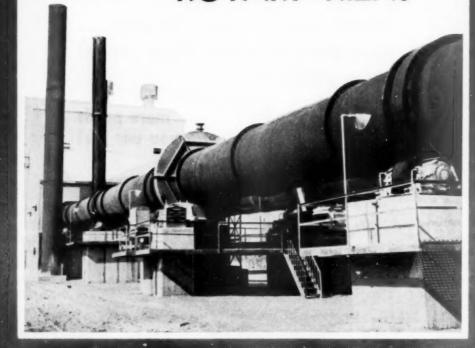
GENERAL TIRES YOUR NEW EQUIPMENT

65



# SMIDTH

#### **ROTARY KILNS**



Smidth machinery has been supplied to over 70 countries of the world including 1000 rotary kilns and 5000 grinding mills, plus auxiliary machines such as coolers, agitators, washmills, pumps, conveyors, packers, separators, etc. for use in Cement, Lime and Ore plants.

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  11 West 42nd Street
  New York 36, N. Y.
- F. L. Smidth & Co., Ltd., 105, Piccadilly, London, W. 1, England
- F. L. Smidth & Co. (Bombay) Ltd. 42 Queen's Road Bombay, India

# "WE HEAR..."

April, 1953

Construction contract awards in the 37 states east of the Rockies totaled \$2,097,178,000 for the first two months of 1953, or 17 percent above the corresponding period of 1951, according to an F. W. Dodge Corp. report. February construction, however, showed a 5 percent decrease from January figures, but was still 15 percent higher than February, 1952. February, 1953, awards, according to classification, were as follows: Nonresidential awards of \$374,321,000 declined 8 percent from January, but were 24 percent above February, 1952; residential awards of \$418,568,000 were down 9 percent from January, but 6 percent above February, 1952; heavy engineering awards (public works and utilities) amounted to \$228,421,000, a 9 percent decrease from January, but a 22 percent increase over February, 1952.

The Missouri Highway Department is off to a "head start" this year in procuring replacement road-surfacing materials, according to the Missouri Limestone Producers Association. Total tonnage purchased from January 1 to the end of February totaled 486,219 tons, of which 260,161 tons were stone and 226,058 tons were gravel and chat. This was said to be about 50 percent more than was purchased during the comparable 1951 period.

A \$255,000,000 Florida turnpike has been proposed by the state's improvement commission. The proposed project would consist of a 313-mi. north-south turnpike from Jacksonville to Miami and a 130-mi. cross-state route which would begin near Clearwater on the west and join the main road southeast of Orlando. The turnpike, which would require an estimated three years for completion, would be financed by a \$255,000,000 bond issue.

A bill has been introduced into the New Jersey state legislature which would appropriate \$75,000 for promotion of safety in New Jersey mines and quarries. The measure would grant the appropriation to the Department of Labor and Industry "to provide services deemed necessary for protection of life, limb and property and to promote the best interest of public safety, health and welfare."

Construction of entertainment and recreational projects <u>may total as much as \$250,000,000 in 1953</u>, as predicted by the National Production Authority.

Restrictions on recreational building, which had been in force since October 26, 1950, to divert scarce structural steel into defense and industrial expansion projects, were lifted by N. P. A. on January 1, 1953. According to N. P. A., the steel industry is now in a very good position so far as supplies of steel scrap are concerned. At the end of October, 1952, steel mills and other users reportedly held an average of more than 60 days' supply of scrap, a record-high inventory, although this level is expected to drop somewhat by the end of the year if the steel industry maintains the record rate of ingot production scheduled for 1953.

A 23-year old concession granted to the Palestine Potash Co., Ltd., to recover minerals from the Dead Sea, was recently canceled by the Jordan government which reportedly plans to form a joint government and private company to utilize these resources.

Construction equipment, valued at \$1500, was recently stolen from an Ohio gravel company. Two teen-age youths, who were charged with the theft, reportedly sold the equipment to a junk dealer for \$32.

The antifoam properties of silicones, found so useful in industry, are now being exploited in the medical field as a therapeutic treatment for patients with pulmonary edema or "fluid in the lungs," as recently reported in Chemical and Engineering News. Patients thus afflicted are constantly threatened with a possibility of churning the fluid into a foam which would then penetrate the upper respiratory system, resulting in death from internal drowning. A University of Michigan research team found that froth from the lungs could be reduced to liquid by inhaling silicone spray, thus keeping the lungs free for breathing until the cause of the trouble could be corrected.

The Bureau of Reclamation, in celebration of its 50th anniversary, has issued an illustrated booklet describing its accomplishments during the past half century. The booklet is primarily a financial report of the bureau's spending of \$2.5 billion of public funds. According to the report, over \$460,000,000 have been recovered from various types of receipts, including repayments by water users, power revenues, etc., which is an approximate 20 percent return of its total outlay. The remainder is expected to be recovered within the next few years. The bureau's accomplishments, however, might seem less noteworthy if fairly compared with competing private industry which does not have access to interest-free funds (supplied by taxpayers) for investment purposes, or which has tax-free revenue from such investments. As gathered from the report, the bureau so far is responsible for but one-quarter of the 24,000,000 acres brought under irrigation in 17 western states and, during the past 50 years when it has brought its power output up to 26 billion kw. hr., private industry, at the same time, increased its power output from 2.5 billion to about 310 billion kw. hr.

According to recent reports, the anticipated toll road boom promises a bonanza for material suppliers and machinery manufacturers. Highway engineers have predicted that the present toll-road mileage (approximately 1900 miles) will be doubled within the next five years. One large machinery manufacturer has predicted a 25 percent increase in company sales of crawler-type tractors and diesel engines to road contractors. Another manufacturer anticipates a 12 percent sales increase of road equipment machinery.

Contract awards for heavy construction, nationally, totaled \$3,449,445,000 for the first 11 weeks of 1953, which was an all-time high and 38 percent above the total of \$2,505,678,000 for the first 11 weeks of 1952, as reported by Engineering News-Record. Private mass housing and industrial building are continuing strong, while federal contracts have declined under the new administration's policy of re-examination before awarding new contracts.

. . . . . . . .

The recent lifting of most price controls is not expected to bring about an inflationary spiral in the price of most major building materials, according to predictions of executives of many large companies. One eastern cement official predicts a cement price increase of not more than ten cents per bbl. Similar increases are expected elsewhere, but competition is expected to act as a strong brake against inflationary prices.

A bill has been introduced in the New York state legislature which would permit towns in Broome County, N. Y., to set up safety regulations governing local stone quarries, sand, gravel and other excavations. Demand for enforced safety regulations followed the recent drowning of a child in a Broome County gravel pit.

New construction expenditures in 1953 will climb \$1.2 billions above the record high of 1952, as predicted by the Commerce and Labor Departments. Increased activity is expected in both private and public building. Construction outlays in 1952 were estimated at \$32.3 billion, compared with a little over \$31 billion in 1951.

Another quarry fatality has been reported—this time at a Missouri underground operation. A 300-lb. ceiling rock became dislodged and struck the victim on the head while he was operating a high lift.

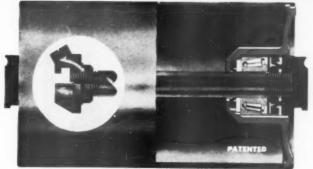
THE EDITORS

# **CONTINENTAL'S** Idlers

**GOUNIT-SEALED** 







Saves Grease!

Continental's Unit-Sealed "UST" Conveyor Idlers, incorporating Timken Bearings, Garlock Klosures, are the answer to the operator's prayer.

The Unit Bearing Assemblies—"sealed provide an ample but not excert represents a saving of possible mineral possible minera Saves Belts!

Continental "UST" Idler for extended periods of time without relubrication for 1-2-3 years or longer depending upon the severity or character of conditions.

for detailed information on these idlers write for Bulletin R. P. - 116

Long Life- THE ULTIMATE IN MINIMUM MAINTENANCE

INDUSTRIAL DIVISION CONTINENTAL GIN COMPANY

ENGINEERS



ATLANTA . DALLAS . MEMPHIS . NEW YORK COTO MANUFACTURERS



# RAYMOND ROLLER WILLS

THE Raymond line of Roller Mills includes a full range of sizes and types of units to meet the varied requirements of the non-metallics industry:—Capacities from a few tons up to 30 tons or more per hour... Finenesses from 20 mesh to 400 mesh materials. Over sixty years of continuous development are responsible for Raymond leadership in advanced design and automatic operating features, record economy in production and maintenance, as well as long, dependable service.

The Whizzer Separator provides utmost flexibility and ease of adjustment for fineness control, and also insures particle size uniformity of finished product.

The Pneumatic Feed Control is a production booster that maintains a maximum "load" on the mill and keeps it operating at peak capacity by preventing underfeeding or overfeeding.

Raymond oil journals and efficient lubrication system, the high grade bearings and heavy duty construction, all help to keep down overall costs and show a consistent low ratio of power consumption to tonnage output.

Write for Roller Mill Catalog No. 69

#### RAYMOND SUPER ROLLER MILL

Available in the larger sizes for delivering 15, 20, 30 or more tons per hour of finished material classified by air separation. These big units save space, centralize equipment, simplify material handling and eliminate multiple maintenance and supervision expense.



RAYMOND SUPER ROLLER MILL Shown with two automatic feeders and Whizzer Separator with independent drive unit.

#### COMBUSTION ENGINEERING

Refer your grinding problems to Raymond engineers to insure proper equipment for your job.

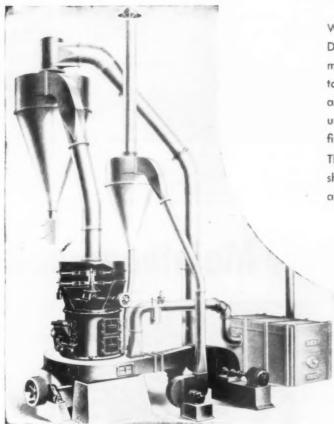
**Raymond Pulverizer Division** 

# ECONOMICAL PRODUCTION OF GYPSUM OF BARYTES PHOSPHATE ROCK PHOSPHATE ROCK PHOSPHATE ROCK PRODUCTS And other Non-Metallics Non-Metallics

# RAYMOND ROLLER MILL WITH Flash DRYING

When equipped with the Raymond Flash Drying System, the Roller Mill can handle materials which contain as high as 10% to 15% of moisture. The material is dried and pulverized simultaneously in a single unit of equipment, and the mill delivers a fine, dry, free-flowing product.

This method eliminates separate dryers, shortens process time, saves plant space and reduces cost of production.



Raymond High Side Roller Mill with Whizzer Separator, fully equipped with Flash Drying Accessories for drying and pulverizing in one operation.



LABORATORY MILL

Complete motored unit for pulverizing small batches of dry materials for Laboratory analysis.

### -SUPERHEATER, INC.

1307 North Branch St.

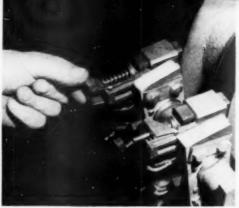
Chicago 22, Illinois

Sales Offices in Principal Cities





1 To reset brush tension, operator releases spring lock . .



2 slides it back to relieve pressure . . .



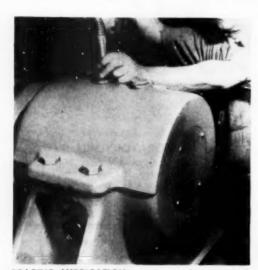
3 and swings lecking device to one side . .



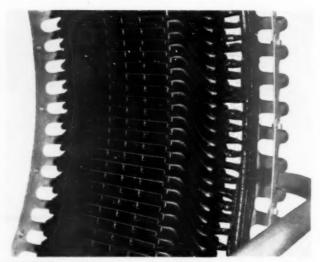
4 for fast and easy brush removal.

BRUSH-PRESSURE ADJUSTMENT, for maximum brush life, and replacement, to assure reliable motor service, are simple matters on G-E synchronous motors. A calibrated spring-loaded brush holder makes resetting brush tension or removal of brushes fast and easy. Brushes are staggered for even brush-ring wear.

## See How Routine Maintenance Is

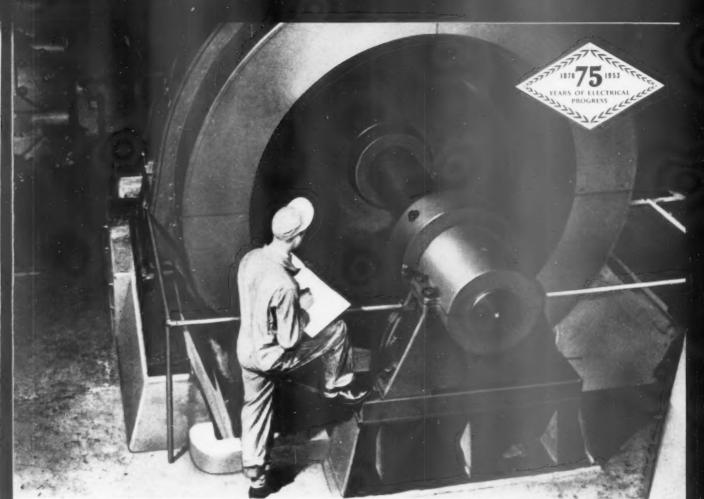


BEARING LUBRICATION can be readily checked through a large sight-level gage on the bearing pedestal; and when oil is required, handy snap-top covers are provided for easy refilling, as well as oilring inspection. A drain plug is conveniently located for quick oil changes.



INSULATION CLEANING is fast on G-E synchronous motors. Windings are coated with a high-gloss Glyptal\* varnish that resists the accumulation of dust and can be vacuum or air cleaned in most applications. In extremely dusty or oily atmospheres, deposits can be easily wiped from the windings. Clean windings mean longer insulation and machine life.

\*Reg. trademark of General Electric Co.



THIS G-E SYNCHRONOUS MOTOR, RATED 4500 HP, 300 RPM, DRIVES A RECIPROCATING GAS COMPRESSOR.

# **Easier on G-E Synchronous Motors!**

Routine maintenance involves three factors: brushes, lubrication, and insulation. To be sure that these areas are properly serviced, G-E synchronous motors have design features that make checking easy and maintenance fast. Close at hand and easy to adjust, the brush-rigging construction encourages your maintenance men to inspect regularly. Oil-level gage and inspection caps are arranged for quick checking and filling when necessary. The high-gloss insulation on G-E synchronous motor windings resists the adhesion of dust and minimizes the need for cleaning.

These features promote long, reliable motor

service and save valuable time for your maintenance crews.

Before selecting your next heavy-duty motor, be sure to consider these important maintenance features. Call in your G-E representative. He will be glad to discuss the many money-saving applications for G-E synchronous motors. Meanwhile, you can obtain more information on G-E synchronous motors by requesting the following publications: GEA-5332, "Low-speed Synchronous Motors" or GEA-5426, "High-speed Synchronous Motors." Write to Section 770-28, General Electric Company, Schenectady 5, N. Y.

You can put your confidence in\_

GENERAL ( ELECTRIC

# Power-Packed 100% Hydraulic Performance



### DEMPSTER-DIGGSTER OFFERS YOU BIG SHOVEL HYDRAULIC PERFORMANCE IN A SMALL, MOBILE UNIT...

The Dempster-Diggster is the only small shovel that offers you all these basic and important features of big shovels—Simultaneous and Independent Crowd and Hoist . . . Hydraulic Crowding . . . Hydraulic Hoisting . . . Variable Crowd Action at any Dipper Position . . . Changeable Buckets.

With these big shovel features, plus truck speeds on the job, and to and from jobs, the Dempster-Diggster enables you to speed up production for greater profits on jobs requiring excavation or loading!

Write for complete facts on this revolutionary, power-packed shovel. A product of Dempster Brothers, Inc.



Large photo shows position of bucket when at extreme height above ground. Two small photos illustrate how, in excavation or loading, bucket follows slope of material—getting a full bucket with every stroke. Dempster-Diggster digs-in 15 inches below grade and digs out a 15 to 18 foot bank.

DEMPSTER BROTHERS
343 N. Knox, Knoxville 17, Tennessee





cuts across the lines of force at points of maximum stress giving maximum breaka

This unusual sequence of photos shows explosives force, first swelling and then bursting a solid face of granite. It is visual evidence of the excellent breakage possible with the ROCKMASTER blasting system used in an alternate pattern.

Theory behind the breaking action of this pattern is that the first delays, detonating within definite limits of controlled timing, place the entire burden under stress. Then at the moment of maximum tension the second delays, also firing with controlled timing, throw the second punch which produces a wedging and bursting action throughout the burden. The explosives gases of alternate ROCKMASTER blasting can be kept under prolonged confinement, reducing both air blast and ground vibration to a minimum.

Alternate action cannot be duplicated by progressive milli-second delay firing methods or by any form of top detonation.

If you want to see how others have profited by using ROCKMASTER milli-second delay detonators with the ROCKMASTER system of explosives choice and loading methods, send for your free copy of the 20-page book "Quarry Blasting the ROCKMASTER Way."



### ATLAS EXPLOSIVES

"Everything for Blasting"

ATLAS POWDER COMPANY, WILMINGTON 99, DELAWARE Offices in principal cities

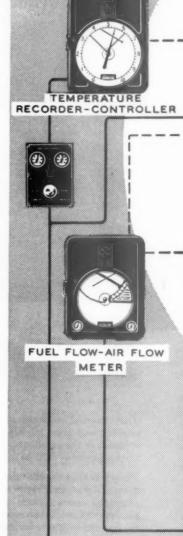
# Now poperation operation self-serve operation Meter Bailey

Your "Self-Serve" Bailey controlled rotary kiln literally thinks for itself and reacts quickly and correctly to any changes in operating conditions. You get:

- 4. Economical Operation—Gives maximum production from every unit of fuel you burn because Bailey Combustion Control closely guards Fuel-Air Ratio, Hood Draft, Fuel Feed, Clinker Cooling and Temperature of Air for Combustion.
- 2. Uniform High Quality of Product—Accurate measurement and control of Kiln Speed, Burning Zone Temperature, Combustibles Content and Oxygen Content . . . for a high grade product, consistently.
- Minimum Maintenance—Uniform excess air conditions and constant temperatures prolong the life of your kiln. Costly refractory repairs and wear and tear on auxiliary equipment are reduced to a minimum.

The accompanying diagram shows one way in which Bailey instruments and controls can give you a "Self-Serve" Kiln. Other arrangements to suit the requirements of any rotary kiln are available.

Bailey Meter Company maintains a staff of engineers who are experts in the control of rotary kilns. Let one of these men help plan a control system to give you a "Self-Serve" rotary kiln.



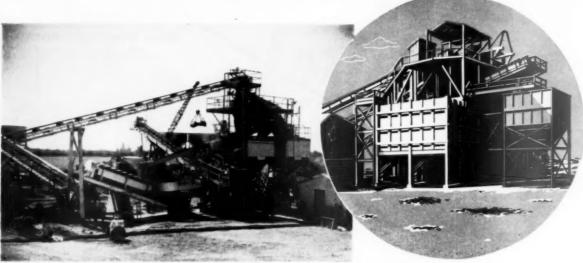
### Kiln Control HOOD DRAFT RECORDER RADIATION THERMOCOUPLE VALVE METER AIR FLOW ORIFICE To learn more about Bailey Rotary Kiln Control Systems, write to Bailey Meter Company at the address shown below. Ask for complete details of operation of the Rotary Kiln OUTLET Control System illustrated in this diagram. DAMPER DRIVE F.D. DAMPER DRIVE O, RECORDER - CONTROLLER

Meters and Control Systems for Process Plants

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Bailey Meter Company Limited · Montreal

# FOR MORE PROFITABLE OPERATION... Get a WKE designed sand and gravel plant



Typical aggregate plant with a No. 48 Wemco Sand Preparation Machine

Profitable sand and gravel operations in today's competitive market require plants of high productivity and efficiency. Western Knapp Engineering Company, a division of Western Machinery Company, offers you a wealth of experience in the design and construction of such high profit plants—plants that pay off because they were planned and equipped to produce better specification aggregates at lower cost.

WKE service is all-inclusive from analysis of aggregate samples and plant design to materials procurement, equipment installation and initial plant operation. WKE's extensive purchasing facilities are capable of providing any type of equipment and supplies required by design or customer preference.

As a WKE client, you will also benefit from the facilities of Western Machinery Company, a leading supplier of crushing, washing, screening and material handling plants. In addition, Western Machinery manufactures a well-known line of aggregate processing equipment. Included in the Wemco line are Sand Preparation Machines, Attrition Machines, Sand Pumps, Hydroseparators and Thickeners.

This combination of engineering-construction, procurement and manufacturing skills assures the top coordination required to provide you with aggregate facilities of maximum operating efficiency.

If you are planning the construction of new or additional sand and gravel facilities, it will pay you to investigate the complete service offered by the WKE/WEMCO team. Write today! No cost or obligation.



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#### The Problem of How to Get Farmers to Buy More Agricultural Limestone

PRODUCERS OF AGRICULTURAL LIMESTONE are concerned for the future of their business now that the federal government has indicated that appropriations for soil conservation practices are

not to be depended upon permanently.

The record has proved that there is real cause for skepticism by many producers. Before the beginning of the government program to assist farmers, twenty years ago, very little agricultural limestone was used. The tonnage of liming materials spread grew rather rapidly in the last ten years to a peak annual figure of some thirty million tons, largely through the stimulation of government payments during years when farm income was at a high level. Under those conditions the farmer was not always unwilling to pay his allotted share out-of-pocket for liming materials.

Surveys have disclosed that the nation's soils require the application of 495 million tons of liming material for restoration and that 50 million tons must be spread annually for a minimum maintenance job. That fact isn't of concern only to the agricultural limestone producer but to all of us since the wealth of the nation depends upon the ability of the land to produce. Liming materials are the number one basic requirement for farm production and for preservation of soil fertility. The tons spread must be increased, by whatever means it takes, rather than be reduced which is the threat now, with lower farm income and contemplated reduced government participation.

Many producers and agronomists consider it a great "mystery" that farmers do not use more liming materials, in view of all the accumulated technical data that indicate the absolute need for liming soils and prove that there are substantial financial rewards to farmers who lime properly.

There is no question but that the agricultural limestone industry has many powerful sales tools at its disposal which are absolute proof that the farmer who needs to lime will have his investment paid for many times over. When a farmer can profit in terms of several hundred percent and still doesn't buy, there must be something radically wrong with getting the story across.

Liming is an intangible and the approach must therefore be educational merchandising on a high plane, using the readily available technical data in all manner of advertising and promotional media. The relatively few producers who have been following the practice have been successful. They are not too concerned about the fate of soil conservation appropriations but, more important, their customers have been sold on the merits of agricultural limestone.

It is freely admitted, even by producers who have not followed such a long-range practice, that that is the only solution to increasing sales. But, they say that prices for their product are too low to permit the necessary sales expense and thus admit that they have contributed nothing to really promote its use.

Their customers have not been educated to the merits of agricultural limestone and many of them have bought only because they assume that liming must be good or the government wouldn't

put out part of the cost.

One of the weaknesses of the cost-participating program of the government, while admittedly it has done a good job in getting farmers started in the application of agstone, has been that it has contributed to a situation which has retarded progress beyond a certain point. The program has been responsible for many producers entering the business, in its objective to make low-priced agstone readily available. Competition and bidding for A.C.P. business have held prices so low as to prohibit a sales budget. As an out, many have competed for trucker and distributor business at cut prices which only has aggravated the problem.

What the industry needs to do is provide for an adequate sales cost in its price structure. Then, a producer can hire good sales representatives, train them well and pay the necessary incentives for a sound job of selling. There is no substitute for personal contact in selling anything, when backed with a good promotional campaign.

Agstone should be sold on its nutrient values, not just as a soil sweetener, and applied so as to yield optimum results, recognizing the necessity of other fertilizers in a package deal, substantiated by soil tests, that will give liming the chance to prove its worth. The product should be delivered on time and stockpiles provided where necessary to improve service, take care of peaks and cut haulage costs. Quality of product must be maintained and a good job of spreading done,

Federal soil conservation appropriations may prove out as necessary to our national welfare, and only time can tell, but producers should not sit back and fear the results of cut-offs or reductions that may come at any time,

Bron Mordberg

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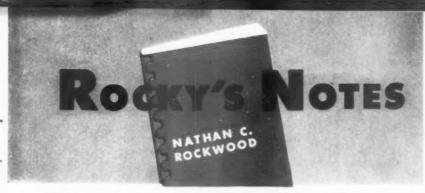
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#### Mineral aggregates for the soil

WE ARE NOT USED to thinking of the soil as composed of mineral aggregates especially adapted to a very specific purpose, just as are specific mineral aggregates required for concrete. Yet such is the case, and concrete researchers can take heart in knowing that problems in connection with the part soil aggregates play in the growth of plants, and through them of animals, are infinitely more complex than the aggregate problems of concrete. Plants and animals both are composed chiefly of water, for water is the chief ingredient of the hydrocarbons, fats and proteins which are living tissues. Through their root systems in the soil, plants exchange hydrogen derived from the water that is hydrolized (broken down into oxygen and hydrogen) for the positive ions of such metal elements as calcium, iron, potassium, etc. These elements represent a very small percentage of the whole plant, and not a great deal is yet known as to just how they function in plant metabolism, but their absence from the soil eventually results in stunted, diseased and insectridden plants.

The Earth, presumably, was originally composed of the chemical elements in vapor form. These condensed to liquid form, and the liquid mixture proceeded to crystallize or solidify according to laws of thermodynamics, which caused the heaviest elements like iron and nickel to separate out and sink through the lighter materials and thus concentrate in the center where the force of gravity is greatest. Thus the lithosphere, or outermost crust, contains practically all the lighter elements, and most of these in the form of silicates which were among the last of the minerals to crystallize. The process apparently was much like what happens in a blast furnace where the molten iron sinks and the slag, the silicate containing most of the impurities of the ore, rises to the top and eventually solidifies as an artificial kind of silicate rock.

The last of the vapors to condense was the atmospheric water or moisture. When it did condense it filled the holes and cavities and formed the oceans. But probably long before the moisture of the early Earth's atmosphere condensed to liquid water, it had started its destructive work

on the lithosphere, aided by carbon dioxide (CO<sub>-</sub>), which probably constituted a large percentage of the original atmosphere. Water, the most essential mineral to all living things, is also the most destructive mineral to the rest of the mineral kingdom. By chemical solution, by abrasion of running streams from the tiny trickle from a spring to a mighty river like the Mississippi, it is always loosening and carrying on its way particles of rocks and minerals from colloidal size to gravel. Freezing as continental ice caps, as water has at various stages of the Earth's geological history, the processes of abrasion were much speeded up and in some places, as the Canadian shield, the glaciers thus formed, wore away all the outer lithosphere down to the deep bed rock, which is presumed to enclose the metallic core of the Earth.

#### **Process of Weathering**

Originally, therefore, the Earth had no soil and no life, but with water in the atmosphere and on the surface. the beginnings were there; the processes of weathering the lithosphere began. This weathering is a combination of the effects of water, ice, temperature changes, wind-laden dusts. 'dust-laden" water, chemicals such as solutions of chlorides, sulphates, etc., derived both from volcanic gases and from the disintegration of the minerals themselves. Geochemists classify this disintegration of the Earth's lithosphere into (1) Resistates; (2) Hydrolyzates; (3) Oxidates; (4) Reduzates; (5) Precipitates; (6) Evaporates; (7) Bioliths.

The resistates are the residual sediments of rocks and minerals which have resisted chemical solution; quartz, silt, sand and gravels, some feldspars, and the sedimentary rocks that are formed from these fragments. These, of course, are a necessary part of the soil because they are the coarsest part and permit the circulation of water below the surface. The hydrolyzates are partly chemically altered minerals (hydrolyzed) and partly undecomposed finely ground rock powder. Clays, shales and slates are hydrolyzates. Clay does not mean any particular mineral, but merely a particle less than 2 microns in diameter, but aside from some fine particles of silica, the clay minerals are largely the alumino-silicates with alkalies and alkaline earths derived from feld-spars. They are most important to soils because they have the property of "base exchange". That is they will give up their sodium, potassium, calcium and similar positively charged ions in exchange for the hydrogen released by the plant roots; they also exchange with each other, so that they act as reservoirs for the minerals needed for plant growth and health. Most important of all they retain water, without which the other exchanges would not be possible.

Oxidates are the precipitates of the hydroxides of iron, manganese, etc., and the precipitation is caused by absorption of oxygen in surface waters of lakes and seas. Surface waters contain extra oxygen, over and above that required for water (H.O), because such water dissolves some oxygen. This is the process by which ions of the heavy metals such as iron probably are made available to plant roots. The Reduzates are the opposites of the oxidates, since they are the products of chemical reactions in which oxygen has been removed by reducing conditions or surroundings. They form sediments in land-locked waters where circulation is poor, or there is stagnation. Precipitates are formed by inorganic precipitation of water solutions. The most important of these to the soil are the precipitates of calcium and magnesium bicarbonate solutions to form carbonates. Most limestones, and probably dolomites, however, owe their origins to Bioliths, which means that the bicarbonate solutions first passed through living organisms, and were made into shells, etc. The Evaporates are mostly salt deposits (including gypsum) which accumulated by evaporation of the water in which they were originally dissolved. They are the sources of some of the minerals used in soil improvement.

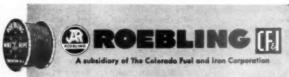
#### Good Idea Matures Slowly

The quality of the soil in various parts of a continent varies tremendously, since it is composed merely of fragments, or chemically altered mineral molecules or colloids from the Earth's original lithosphere. There is no reason to believe that the rate of heat loss in the cooling of the original sphere was everywhere the same. even if the molten mixture of minerals or magma was the same. Hence, different schemes of crystallization followed. Even after the crust was formed, weathering conditions were different, so in spite of the fact that soil chemists have endeavored to classify types of soils, there naturally is much variation of mineral content even in any one type. As soon as mankind started to cultivate the soil. he introduced new factors in soil deterioration, which he was a long time in comprehending. Eventually he learned that he was robbing the soil of some of its mineral content every time a load of grain or other crop



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### **LABOR RELATIONS TRENDS**

Two Vital U.S. Supreme Court Decisions—Texas Ready-Mixed Concrete Producer Loses to Truckers' Union

By NATHAN C. ROCKWOOD

T LOOKS NOW that the only way to get a more favorable interpretation of the Fair Labor Standards Act for local producers of sand, gravel, crushed stone, ready-mixed concrete, etc., used locally in highway repair and maintenance, is to get Congress to revise the Act in language more specific as to what most of us believe was the original intent. That is the opinion of two U.S. Supreme Court justices who dissented from the majority opinion in the Alstate Construction Co. and Hempt Brothers cases. The Alstate case was the one which the National Sand and Gravel Association entered as amicus curiaefriend of the court-although the product involved was crushed stone used in Amiesite, an asphalt pavement mixture. The decisions of the lower courts were reported on this page of ROCK PRODUCTS at the time. The decision in the Hempt Brothers case overruled a decision in favor of the producer by the Pennsylvania State Supreme Court.

#### **Alstate Decision**

The complete text of the decision of the United States Supreme Court in the Alstate case is as follows: "Section 7(a) of the Fair Labor Standards Act requires employers to pay each employe covered by the Act not less than one and one-half times his regular pay rate for every hour worked in excess of a forty-hour week; 11(c) requires employers to keep appropriate employment records. Emploves covered are defined as those 'engaged in commerce or in the production of goods for commerce.' We have held that employes repairing interstate roads or railroads are 'engaged in commerce' within the meaning of that clause of 7(a). The question presented in this case is whether employes who work off such roads in

the production of materials to repair them are engaged in the production of goods for commerce within the meaning of 7(a).

"The Wage and Hour Administrator sued in District Court to enjoin the petitioner Alstate Construction Company from violating the overtime and record-keeping provisions of the Act. The District Court found: Alstate is a Pennsylvania road contractor that reconstructs and repairs roads, railroads, parkways and like facilities in that state. The company also manufactures at three Pennsylvania plants a bituminous concrete road surfacing mixture called Amiesite made from materials either bought or quarried in Pennsylvania. Most of it is applied to Pennsylvania roads either by Alstate's own employes or by Alstate's customers. Eighty-five and one-half percent of Alstate's work here involved was done on interstate roads, railroads, or for Pennsylvania companies producing goods for interstate commerce, and 1412 percent was done on projects that did not relate to interstate commerce. Alstate made no attempt to segregate payments to its employes on the basis of whether their work involved interstate or intrastate activities.

"The District Court held that all of Alstate's employes were covered by the Act and granted the injunction prayed, 95 F. Supp. 585. The Court of Appeals for the Third Circuit affirmed, holding that those employes of Alstate who worked on roads were in commerce and that its off-the-road plant employes were producing road materials for commerce, 195 F. 2d 577. On similar facts, the Court of Appeals for the Eighth Circuit applied the Act to off-the-road employes. Tobin v. Johnson, 198 F. 2d 130. An opposite result was reached by the Tenth Circuit in E. C. Schroeder v. Clifton, 153 F. 2d 385, and the Supreme Court of Pennsylvania in Thomas v. Hempt Bros., 371 Pa. 383, 89 A. 2d 776. To settle this question we granted certiorari in this and the Hempt Bros. case. 344 U.S. 895.

"Amesite is produced in Pennsylvania for use on Pennsylvania roads. None of it is manufactured with a purpose to ship it across state lines. For this reason, so Alstate contends, amesite is not produced for commerce. Obviously, acceptance of this contention would require us to read production of goods for commerce as

though written production of goods for transportation in commerce-that is, across state lines. Such limiting language did appear in the bill as it passed the Senate but Congress left it out of the Act as passed. Of course production of goods for the purpose of shipping them across state lines is production for commerce. But we could not hold-consistently with Overstreet v. North Shore Corp., 318 U.S. 125, and Pedersen v. Fitzgerald Construction Co., 318 U.S. 740-that the only way to produce goods for commerce is to produce them for transportation across state lines.

"We held in the Overstreet and Pedersen cases, supra, that those engaged in repairing interstate roads and railroads were in commerce. In Overstreet we pointed out that interstate roads and railroads are indispensable instrumentalities in the carriage of persons and goods that move in interstate commerce. We then held that roads and railroads are in law and in fact integrated and indispensable parts of our system of commerce among the states, and that employes repairing them are in commerce. Consequently he who serves interstate highways and railroads serves commerce. By the same token he who produces goods for these indispensable and inseparable parts of commerce produces goods for commerce. We therefore conclude that Alstate's off-the-road employes were covered by the Act because they were engaged in production of goods for commerce.

"It is contended that we should not construe the Act as covering the offthe-road employes because it was given a contrary interpretation by its administrators from 1938 until 1945. During these first years after the Act's passage the administrator did take such a position. But more experience with the Act together with judicial construction of its scope' convinced its administrators that the first interpretation was unjustifiably narrow. He therefore publicly announced that off-the-road employes like these were protected by the Act. The new interpretation was reported to congressional committees on a number of occasions. Interested employers severely criticized the administrator's changes. Specific amendments were urged to neutralize his interpretation. Such neutralizing amendments were suggested to congressional committees by the National Sand and Gravel Association which has filed a brief before us as amicus curiae. Instead of adopting any of the suggestions to undermine the administrator's interpretation, Congress in a 1949 amendment to the Fair Labor Standards Act provided that all past orders, regulations and interpretations of the administrator should remain in effect except to the extent that any such order, regulation, interpretation . . may be inconsistent with the provisions of this Act, or may from time (Continued on page 164)

<sup>1 52</sup> Stat. 1060, as amended, 63 Stat. 910, 912-913; 29 U.S.C. 207(a), 211(c).

<sup>2</sup> Overstreet v. North Shore Corp., 318 U.S. 125; Pedersen v. Fitzgerald Construction Co., 318 U.S. 749, reversing 288 N.Y. 687 on the authority of Overstreet v. North Shore Corp., supra.

<sup>3 81</sup> Cong. Rec. 7957.

<sup>4</sup> Fleming v. Atlantic Co., 40 F. Supp. 654 affirmed sub nom. Atlantic Co. v. Florida Power & Light Co., 154 F. 2d 751; Southern United Ice Co. v. Hendrix, 153 F. 2d 689; Chapman v. Home Ice Co., 136 F. 2d 353.

<sup>5</sup> See for illustration Hearings before Subcommittee No. 4 of House Committee on Education and Labor on H.R. 40, 80th Cong., 1st Sess., 1374-1375.

<sup>6 63</sup> Stat. 910, 920.

# It Takes All Kinds... and Bemis Makes Em

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# PEOPLE in the news

#### A.C.I. President

HENRY L. KENNEDY, manager of the cement division of Dewey and Almy Chemical Co., Cambridge, Mass., was elected president of the Ameri-



Left, A. T. Goldbeck, retiring president; right, Henry L. Kennedy, newly elected president

can Concrete Institute at the recent annual convention in Boston. A consulting engineer for 17 years, Mr. Kennedy specialized in reinforced concrete design and construction, with experience in concrete practice in the United States, Canada, Germany, England and South America. He obtained his basic engineering education at Wentworth Institute and Northeastern University, Boston, with graduate work at Beaune University in France. He has been a member of A.C.I. since 1934 and has served on Committee 115, research, and Committee 613, recommended practice for proportioning concrete mixes. He has been a member of the administrative board of direction since 1944 and is chairman of the advertising commit-

Mr. Kennedy is author of numerous papers, including "Concrete Containing Air-Entraining Agents," "Homogeneity of Air-Entraining Concrete," "Revised Application of Fineness Modulus in Concrete Proportioning," "Entrained Air-Its Effects on Constituents of Portland Cement Concrete," and "Recent Developments in Concrete Durability," which won the 1947 Herschel Award of the Boston Society of Civil Engineers.

Elected to three-year terms as directors were Jay E. Jellick, manager, Portland Cement Information Bureau, San Francisco, Calif.; Federico Ba-rona de la O, head of Technical Department of Materials, Hydraulic Resources Ministry, Mexico City, Mexico; Arthur P. Clark, research associ-

ate, American Iron and Steel Institute, at the National Bureau of Standards, Washington, D.C.; and Vernon P. Jensen, staff consultant, C. F. Braun and Co., Alhambra, Calif. Charles S. Whitney, consulting engineer, Ammann and Whitney, New York, N.Y., was elected to a two-year term as vice-president of the Insti-

#### Third Generation Serving **Lime and Cement Business**

ROBERT SUNDERLAND, recently appointed secretary and assistant treasurer of the Ash Grove Lime and Portland Cement Co., Kansas City, Mo., is



Robert Sunderland

the third generation of the family to be active in the business. He is the grandson of Lester T. Sunderland,



Purd B. Wright, Jr.

chairman of the executive committee. and the eldest son of Paul Sunderland. chairman of the board. Born in Omaha, Neb., Robert Sunderland graduated from Washington University, St. Louis, Mo., with a B.S. de-



A. K. Frolich

gree in business administration. His studies at the university were interrupted by service in the Army Air Force which took him to the Philippine Islands, Okinawa and Japan. He joined Ash Grove in 1947 and advanced from credit manager to assistant secretary and credit manager and then to secretary and assistant treasurer.

Purd B. Wright, Jr., general sales manager, and A. K. Frolich, chief engineer, were named vice-presidents of the company.

#### **Administrative Committee**

BLAINE S. SMITH, president of Universal Atlas Cement Co., New York, N.Y., under the merger of the United States Steel Co. into the United States Steel Corp., becomes a member of the general administrative committee. Other changes include the election of Clifford F. Hood as president, succeeding Benjamin F. Fairless, who remains chairman of the board and chief executive officer; Robert C. Tyson, vice-chairman of the finance committee and a member of the board of directors and of the finance committee; Harvey B. Jordan, executive vice-president of operations; Howard E. Isham, vice-president and treasurer, succeeding Mac D. Howell, who has retired; and Walter F. Munford, president of the American Steel and Wire Division.

#### Named Vice-President

EVERETT E. KNOTT has been named vice-president and general manager of Texcrete Co., Dallas, Texas, in addition to his duties as manager of



Everett E. Knott

sales for the Dallas Lightweight Aggregate Co. and the Texas Lightweight Aggregate Co. Mr. Knott joined the organization in 1950, became special sales representative for Texcrete in 1951, and later was appointed general sales manager for Texas Industries, Inc. He was formerly assistant sales manager of the Texas division of Lone Star Cement Corp., and sales manager of the Indiana division. In 1950 he established the sales department for the Halliburton Oil Well Cement Co., Corpus Christi. A. native of Dallas, Mr. Knott attended Southern Methodist University, Dal-

#### **Vice-President Retires**

IRVING WARNER, vice-president in charge of engineering and purchasing, Warner Co., Philadelphia, Penn., has retired from active service after almost 49 years with the company. He will continue as vice-president in an advisory capacity. E. L. Shoemaker, chief engineer of eastern operations, has become director of engineering and purchasing. He has also been appointed a member of the operating committee, Arthur I. Martindale of the engineering department, succeeds Mr. Shoemaker as chief engineer of eastern operations in addition to serving as assistant to Mr. Shoemaker.

Mr. Warner joined the company in 1904 following graduation from Cornell University with a degree in mechanical engineering. In 1915-16 he supervised construction of the lime plant at Cedar Hollow and the building of the first rotary kiln in the East. In 1922 he went to Bellefonte as general manager and chief engineer. During his years with the company, Mr.

Warner has contributed many developments to the industry, among them being the steel lime storage bin which he built at McCoy plant and later at Cedar Hollow, which is now common practice throughout the industry. Other developments include the mechanical system of handling, cooling, screening and loading lump lime, and the development and successful operation of the first continuous system of pressure hydration of lime, for which he held a patent, and he was foremost in early development of sound methods in the use of pur-

chased power.

Mr. Shoemaker was born and educated in Philadelphia. He graduated from the University of Pennsylvania in 1917 and served in the Engineer Corps during World War I. He was called back to service in World War II and served as chief of the engineering and development section of the Engineer Military Supply Division. New York. Prior to joining the Warner Co., Mr. Shoemaker furnished engineering services to the West Jersey Sand and Supply Co. When the company merged with Warner in 1927. he continued to furnish engineering services to Warner Co., until the Warner-Van Sciver merger in 1929, when he joined the company on a full-time basis as chief engineer. He returned to the University of Pennsylvania to take post-graduate studies and in 1939 secured his full C.E. degree.

Mr. Martindale became associated with the company in 1950 as an engineer. He was formerly chief plant engineer of the chemical plant of the Publicker Industries, Inc., where he was in charge of maintenance, machine shops, construction and product development. Born in Omaha, Neb., Mr. Martindale moved to Philadelphia where he attended high school and college. He received his A.B. degree in mathematics in 1931; his B.S. degree in civil engineering in 1933; and his technical degree in civil engineer-

ing in 1952.

#### Officers Re-elected

RAY C. NOLL was re-elected president and general manager of Whiterock Quarries, Inc., Pleasant Gap, Penn., at the recent annual meeting. Other officers re-elected are: W. C. Smeltzer, vice-president, and Eugene Wholaver, secretary-treasurer. Directors renamed are Ray C. Noll, W. C. Smeltzer, Eugene Wholaver, John G. Love, William R. Young, J. Orvis Keller and Ray C. Melroy.

#### **Association President**

H. P. WILLIAMS of Martinsville, Va., has been elected president of the Virginia Ready-Mix Concrete Association. F. Ray Shield of Norfolk was elected treasurer, and Emmett Lindsay of Roanoke, secretary-treas-

#### On Assignment in Burma

C. MACARTHUR CARMAN, consulting engineer of New York City, and a contributor to ROCK PRODUCTS, is in Rangoon, Burma, on an assignment with Knappen, Tippetts, Abbett and McCarthy, international consulting engineers of New York, N.Y. This firm has a contract with the Government of Burma to make a complete economic and industrial survey of the country, and Mr. Carman has been placed in charge of all of the industrial survey, including portland ce-ment, lime and other non-metallic minerals industries.

#### **Heads Technical Laboratory**

ERNEST C. McDonald, Jr., has been placed in charge of the new technical service laboratory of The Georgia Marble Co., Calcium Prod-



Ernest C. McDonald

ucts Division, Tate, Ga. He was formerly in charge of paint and varnish research for The Eagle-Picher Co., Inc., Cincinnati, Ohio. Mr. McDonald graduated from Kansas State College, Pittsburg, Kan., in 1940 and served in the Navy for three years during World War II.

#### **Executive Vice-President**

GEORGE W. GARRETT has been named executive vice-president and general manager of the Stewart Sand and Material Co., Kansas City, Mo. He formerly was secretary and vice-president. Other officers of the company are: John Prince, president; S. E. Honey, treasurer; William J. Stewart, sales manager; and George H. Cook, general superintendent.

#### Member of the Board

NORMAN ARMOUR, former U.S. Ambassador to Argentina, has been elected to the board of directors of Lone Star Cement Corp., New York, N.Y.

#### A.C.I. Honorary Member

RODERICK B. YOUNG, assistant director of research, Hydro-Electric Power Commission of Ontario, Can-



Roderick B. Young (left) accepting certificate
of Honorary Membership from President A. T.
Goldbeck

ada, was presented a certificate of Honorary Membership in the American Concrete Institute at the A.C.I. Awards luncheon during the 40th annual convention held recently in Boston. A past president of the Institute, Mr. Young served on its board of direction and has been active on several technical and administrative committees. He is author of numerous papers on concrete and received the A.C.I. Wason Medal for his 1937 paper on "Concrete-Its Maintenance and Repair." He was also awarded the Thomas F. Rowland prize of the American Society of Civil Engineers for 1928. In 1950, Mr. Young was appointed chairman of the committee on concrete and reinforced concrete of the Canadian Standards Association. He was also one of the original organizers of the National Ready Mixed Concrete Association, of which he is now an honorary member. Born in Minneapolis, Minn., Mr. Young has spent most of his active years in Canada, graduating from the University of Toronto in 1913.

#### OBITUARIES

FRED O. EARNSHAW, a director and retired president of the Carbon Limestone Co., Youngstown, Ohio, passed away March 3 at his country home near Hillsville, Penn. He was 77 years old. A well known figure in the crushed stone industry, "Uncle Fred," as he was known to his many friends, was born in Morris, Ill., and went to Wheaton College and to the Chicago School of Business. He worked for the Western Stone Co., Joliet, Ill., and with his father established the Earnshaw Stone Co., Lemont, Ill. Later he joined the France Stone Co., Sandusky, Ohio, as traveling superin-

tendent in charge of the various quarries. He moved to Youngstown, Ohio, and in 1918 joined the Carbon Limestone Co. as superintendent of the Hillsville, Penn., quarry. He succeeded Robert Bentley, Sr., as president more than 20 years ago, retiring in 1948.

Under Mr. Earnshaw's direction the company initiated many technical developments. The first wagon drills were developed at the Hillsville plant, including an air feed and hoist mechanism, and one of the earliest crushed stone washers was built there. He also initiated technical control and mechanical sampling of every carload going to and from stockpiles, an innovation in the industry at that time.



Fred O. Earnshaw

The power dump devised by Mr. Earnshaw and used at Hillsville for the first time, is now used on many makes of quarry cars. From a blast-furnace "fluxstone" producer, the plant became known for its diversification in producing agricultural limestone, road stone, aggregate for Amiesite, concrete brick and block and stone sand.

Mr. Earnshaw was given many honors by his business associates. He was named president emeritus of the Pennsylvania Stone Producers Association. A past-president of the National Crushed Stone Association, he was elected an honorary lifetime director of the association. Mr. Earnshaw was also a director of the Carbon Concrete Brick Co., Lowellville, Ohio, the Elkins Limestone Co., Inc., Elkins, W. Va., and the Waukesha Lime and Stone Co., Inc., Waukesha, Wis. He was a brother of George S. Earnshaw, also a pioneer in the crushed stone industry, who died some twenty-odd years ago, and was an uncle of George M. Earnshaw, a former advertising manager of ROCK PRODUCTS.

W. Vernon Brumbaugh, former secretary of the National Lime Association, died February 14 after a short illness. He was 57 years of age.



W. Vernon Brumbaugh

Born in Mapleton, Penn., Mr. Brumbaugh was a graduate of the Carnegie Institute of Technology, Pittsburgh, Penn. He had been with the National Lime Association from 1926 to 1944. For the last 25 years Mr. Brumbaugh had represented manufacturers and distributors through national associations, including the Wax Paper Institute, Inc., and the American Washer and Iron Manufacturers Association, both of Chicago. In 1949 he was appointed executive secretary of the Refrigeration Equipment Manufacturers' Association. Mr. Brumbaugh also served as Washington representative for the American Ladder Institute, National Plywood Distributors Association, Non-Ferrous Founders' Society and the Venetian Blind Association of America. He was a member and past president of the Washington Trade Association Executives and a member of the American Trade Association Executives and the Trade Association Executives Forum of Chicago.

W. Percy McKinney, sales manager of the Volunteer Portland Cement Co., Knoxville, Tenn., died suddenly on January 10. He was 61 years old and had been associated with the company since its establishment 27 years ago. Born in Knoxville, Tenn., Mr. McKinney graduated from Culver Military Academy and Cornell University. He was a lieutenant and flier in the U.S. Navy in World War I and served in Italy.

JOHN HENRY NEWTON, former president of the Riverside Sand and Gravel Co., Bismarck, N.D., died March 9 in St. Petersburg, Fla., where he had been visiting for the past two months. He was 82 years old.



# at MORRIS SAND & GRAVEL CO., MORRIS, ILLINOIS

washing, classifying and dehydrating plant from the ground up. Those mountains of clean, graded sand in the background are not just a vision.

Marris' deposit runs heavy to sand. Gravel is wasted or sold locally. This plant processes over 100 tons per hour. Five to six barges a week are freighted up the Illinois Waterway to Chicago.

Preliminary classification takes place in the two Eagle Water Scalping Tanks.

These are fed from a screen with 1" scalping deck, a %" middle and a \( \frac{3}{16}" \) bottom deck.

The double screw unit at left produces mason sand, the double screw in the center produces No. 1 torpedo sand and the double screw at right produces No. 2 torpedo.

The single screw unit, with section of paddles, right foreground, handles the minus \( \frac{3}{16}" \) plus \( \frac{3}{16}" \) material. The extra abrading action afforded by this paddle equipped unit gets rid of the clay, which was a problem, prior to its installation.

Water inlet valves on both tanks at feed end help to float fines to opposite end, at left, permitting concentration of heavier sand at feed end, thereby assisting classification

and re-blending to make the three types of sand. Material is dredged from a "bayou" with 8" pump.

Eagle Washing and Classifying equipment may be the solution to your problem. Get the opinion of experienced Eagle engineers no obligation. Ask for Catalog 47.





#### **Plans Cement Plant**

OLD DOMINION CEMENT Co., Pennington Gap, Va., was recently incorporated for the purpose of establishing a cement plant in Pennington Gap. A certificate of necessity for purchasing steel for construction of the plant has already been issued. The proposed plant would have a daily capacity of 2000 bbl. of cement.

Among the officers of the newly organized company are Glenn M. Williams, Jonesville, Va., president; Browning Wynn, Jonesville, treasurer; Paul Robins, Walter Stewart, Charles Robinette, W. H. Creech and Bill B. Laningham, temporary directors; and H. P. David, advisor and promoter for the company.

President Williams has named a committee, composed of C. B. Waddell, Sam Davis, B. S. Gillespie, Paul Robbins and Ed Gardner, to select two or three suitable plant sites on which options could be taken for further investigation.

#### **Acquires Perlite Properties**

Great Lakes Carbon Corp., Perlite Division, Los Angeles, Calif., recently announced the acquisition of all perlite properties of the Alexite Engineering Division of Alexander Film Co. Included in the transaction are Alexite's mine at Rosita, Calif., and processing plant at Florence, Colo.

Great Lakes Carbon Corp. reportedly is the largest producer of perlite in the world. Operating a large perlite mine at Socorro, N.M., the company ships ore to a national network of exclusive franchisees, who process the ore and distribute it under the tradename "Permalite" to the

building products industry. The company also distributes perlite under the trade names "Strata-Crete" and "Strata-Seal" to the oil industry; "Skil-kast" to the foundry industry; and "Grellex" to various other industries. The company will operate the Alexite mine and plant, utilizing existing equipment and personnel, and will ship the perlite ore to established customers of both companies.

#### **Grants Quarry Permit**

THE HAVERFORD TOWNSHIP BOARD OF COMMISSIONERS, Haverford, Penn., despite protests of the residents, recently passed an amendment to a zoning ordinance to permit operation of a stone quarry in Llanerch. However, certain conditions were set down to provide "for the health, welfare and safety of the residents." A bond of \$10,000 must be posted to assure compliance with the regulations set forth, which will include the construction of a double fence, with a minimum of 10 ft., to be erected around the quarrying site within 90 days. No manufacturing or storage is to be allowed on the grounds and a buffer zone must be held between the residential area and the quarry.

#### **Limestone Plant**

ARKANSAS-LOUISIANA LIME Co., Inc., Rogers, Ark., is building a crushing plant at Foreman, Ark., for the production of agricultural limestone, which will be marketed in South Arkansas, Louisiana and Texas. William S. Brantingham is president of the company and Ilo Kreecey has been named superintendent for the new plant.

#### Mineral Sands

AMERICAN MINING AND DEVELOP-MENT Co., Tallahasse, Fla., is planning an experimental plant for mining fissionable and other minerals from Florida sands. The plant would be located along Florida's east coast near St. Augustine. The initial plant outlay will be approximately \$100,000, Extensive tests conducted on the beaches indicate the sands to be heavy with minerals of commercial value. Among the minerals found were uranium, ilminite, rutile, zircon and thorium. Plant equipment will include a wet processing plant to separate the heavy minerals and metals from the sands; a stationary drying plant; and a stationary separation plant, including 40,000-volt high-tension separators to divide magnetic and non-magnetic elements.

#### **Asbestos Operation**

Patrick Harrison & Co., Ltd., Montreal, Quebec, has been awarded a contract for mining a minimum of 1,000,000 tons of ore at the property of Dominion Asbestos Mines Ltd., St. Adrien de Ham, Que. Over \$500,000 of equipment is being delivered to the site, enabling the firm to mine asbestos at a rate maintaining a 2200-ton daily capacity, with an ultimate capacity of 4000 tons daily to be attained later. Production is expected to be started by the end of this month.

#### Sells Gravel Interests

HAROLD BRELSFORD, Perry, Iowa, has sold his half interest in Perry Sand and Gravel Co. to his partner, Earl White,

Left: Perlite processing plant at Florence, Colo., houses both the ore crushing and expanding equipment; center, rotary kiln used at Florence plant for expanding the ore; right, transferring ownership of Alexite properties are (left) J. Don Alexander, president, Alexander Film Co., and (right) E. A. Harris, operations manager, Perlite and Dicalite Divisions, Great Lakes Carbon Corp.







#### **Materials Handling Show**

The Materials Handling Exposition, which will be held at Convention Hall, Philadelphia, Penn., May 18-22, 1953, will display thousands of new models of materials handling equipment, valued at more than \$10,000,000, as announced by Clapp & Poliak, Inc., the exposition management.

The exposition is expected to attract more than 25,000 management executives from all parts of the United States and from 40 foreign countries. Among the equipment on display will be lift and fork trucks, both gasoline and battery powered; conveyors, portable and permanent; hoists; monorails; cranes; tractors; trailers; hand trucks; stacking units; skids and pallets; and portable elevators.

The exposition is under the sponsorship of the Material Handling Institute, an organization of equipment manufacturers. In addition to the show, a conference will be held under the sponsorship of the American Material Handling Society, composed of executives of companies which use mechanical handling systems.

#### **Shale Processing Plant**

MOLITE, INC., a newly organized firm, is building a plant at Mandan, N.D., for the production of lightweight aggregate from North Dakota shales. Plant capacity will be about 140 cu. yd. per day, or about two carloads. Dr. R. E. Lemley, president, Light Aggregate, Inc., Rapid City, S.D., is head of the new Mandan company. Plant operations will be in charge of Elmer Clasen, formerly superintendent of the Rapid City plant. Directors are Dr. Lemley and A. G. Olson of Rapid City, and Archie Haley, Sturgis, S.D. The plant is expected to be in operation sometime in May.

#### **Moves Crushing Plant**

NEW YORK TRAP ROCK CORP. is presently moving its stone crushing plant at Cold Spring, N.Y., to Haverstraw, N.Y. The change in location is being made to bring the plant closer to an abundant rock supply. The relocation of the plant will cost approximately \$600,000.

#### **Lone Star Expansion**

Lone Star Cement Corp.'s board of directors recently announced plans for an immediate expansion program at its Lone Star, Va., plant. Capacity is to be increased by 50 percent.

#### **New Insulating Material**

SEALTITE INSULATING MANUFACTUR-ING CORP., Waukesha, Wis., has announced the development of a new material designed specifically for insulating metal clad buildings. The product, known as Seal Foil type PF-4 insulation, is manufactured from mineral wool with heavy aluminum foil backing. The insulation is attached to the outer structure and held in place with special insulation hangers which are permanently bonded to the outside of the steel building with a



Mineral wool insulation with aluminum foil backing, for use on metal clad buildings new type adhesive, developed by the company. No special tools or equipment are said to be needed to install the insulation.

#### **New Sand Plant**

AMERICAN SAND & MATERIAL Co., Turner, Kan., recently completed a new sand plant which is expected to increase production by 25 percent. Capacity of the new plant is 1500 tons per day. Sand and gravel are dredged from the Kaw river. The new plant was built to provide for an anticipated record sales volume for the company's products in 1953. James E. Siler, plant operator, predicts that even though home construction may decline somewhat, heavy construction will remain at a high level.

#### **Company Reorganization**

Inland Lime and Stone Co., Manistique, Mich., formerly a wholly owned subsidiary of Inland Steel Co., has been made a division of that company instead of a separate corporation and will operate under the name of Inland Lime and Stone Co., Division of Inland Steel Co.

#### Sand and Gravel Plant

BRIDGEPORT MATERIALS Co., Dallas, Texas, is establishing a sand and gravel plant near Grand Prairie, Texas. William Boorhem, formerly vice-president and general manager of Malvern Gravel Co., Malvern, Ark., has been named manager of the new plant.

#### California Gypsum

THE CALIFORNIA DIVISION OF MINES recently announced the publication of Bulletin 163, "Gypsum in California." written by William E. Ver Planck, Division of Mines. The report, which is said to be the first comprehensive treatise to be published on all phases of California gypsum, deals with the history of the industry; geologic occurence and origin of the mineral; and mining, processing and marketing of the product. An appendix to the text includes lists of the gypsum deposits, producers and owners, and statistics on gypsum production. Also included are maps, charts and pictures. This 150-page, cloth-bound report may be secured from the California Department of Natural Resources, Division of Mines, Ferry Building, San Francisco 11, Calif., for \$1.85 per copy.

#### **Portland Cement Production**

THE PORTLAND CEMENT INDUSTRY produced 18,855,000 bbl. of finished cement in January, 1953, as reported by the Bureau of Mines. This was an increase of 11 percent compared with the output in January, 1952. Mill shipments totaled 13,520,000 bbl.. an increase of 6 percent over the January, 1952, figure, while stocks were 5 percent below the total for the same month in 1952. Clinker production during January, 1953, amounted to 21,129,000 bbl., an increase of 8 percent compared with the corresponding month of the previous year. The output of finished cement during January, 1953, came from 156 plants located in 37 states and in Puerto Rico. During the same month of 1952, 17,039,000 bbl. were produced in 151 plants.

#### Pavement Yardage

AWARDS OF CONCRETE PAVEMENT for the month of February and for the first two months of 1953 are listed by the Portland Cement Association as follows:

	Sq. yd. awarded	
	February	During first two months 1953
Roads Streets and alleys Airports	1,533,254	
Totals	3,509,198	8,383,038

#### **Talc Plant**

SIERRA TALC AND CLAY Co. of California has established a talc processing plant at Grand Island, Neb., to handle talc mined in Montana. The Nebraska site was chosen because of its ideal location for shipment of finished talcs to midwest and eastern markets.

#### Stone Company Sold

SCHUMACHER STONE Co., Pandora, Ohio, has been sold to Glenn J. Pierman, Columbus, Ohio.

#### **Agricultural Appropriations**

THE NATIONAL AGRICULTURAL LIMESTONE INSTITUTE recently advised its membership that Secretary of Agriculture Benson, in his recent appearance before the House appropriations sub-committee on agriculture, reduced his earlier committed request of \$160,000,000 for the 1954 Agricultural Conservation Program to \$140,000,000, inasmuch as the Bureau of the Budget had decided to slash the 1954 appropriations by \$20,000,000.

N.A.L.I. further advised, however, that, according to Don Williams, chief of the A.C.P., it should not be assumed that limestone will be completely eliminated from the 1954 A.C.P., even though it is being contemplated that no farmer will be given credit for liming on a field that has been limed before and unless the liming material is used directly in connection with the establishment of a permanent practicealthough there appears to be considerable doubt as to what is meant by "establishment of a permanent practice." It was also brought out that 77 percent of the reduction in the Department of Agriculture appropriations asked for by Secretary Benson have come out of the conservation appropriations.

#### **Acquires Five Companies**

TEXAS INDUSTRIES, INC., Dallas, Texas, has acquired controlling interest in Fort Worth Sand and Gravel Co., Inc., and four associated companies, Thomas Gravel Co., Gravel Mining Co., Texas Dry Concrete Co. and B. & R. Transportation Co., all of Fort Worth, Texas. Upon consumation of the transaction, the Texas Industries group will comprise 28 plants, including four sand and gravel, one crushed stone, seven readymixed concrete, six lightweight aggregate, and ten concrete masonry products. Announcement of the transaction was made jointly by Thomas E. Popplewell, president of the Fort Worth companies, and Ralph B. Rog-ers, president of Texas Industries, Inc. Mr. Popplewell and all key personnel will be retained to operate the new divisions as formerly.

#### Safety Conference

RECOMMENDATION that active employe safety committees be organized in all mineral industry plants, regardless of size, was made by the Mineral Extraction Industries section at the annual California Industrial Safety Conference, held in Los Angeles, Calif., February 13-14.

Under the joint chairmanship of H. C. Maginn, executive vice-president, Calaveras Cement Co., San Francisco, Calif., and Porter E. Vandewark, treasurer, Operating Engineers Local 3, the section members prepared a practical safety program for plants with more than 20 employes, and also made suggestions for modified activities in plants of smaller size. Section membership comprised representatives of labor, cement manufacture, metal mining, non-metallic and aggregates industries.

The section report stressed the importance of enthusiastic participation by the plant owner or manager to assure a safety program's success. Other recommendations were that all safety committee efforts be on company time; that individual employes be encouraged to submit safety sug-



H. C. "Pat" Maginn, co-chairman of Mineral Extraction Industries section

gestions to the committee for action; and that a review of all injuries and accidents be made by the employe safety committee which would then issue written recommendations for the prevention of similar accidents in the future.

Members of the section representing the cement, aggregates and non-metallic industries, in addition to Mr. Maginn, were: Robert A. Kinzie, manager, Santa Cruz Portland Cement Co.; P. S. Haas, assistant works manager, Permanente Cement Co.; A. G. Lang, division superintendent, Ideal Cement Co.; R. K. Humphries, president, Pacific Coast Aggregates, Inc.; John N. Asmussen, superintendent, Blake Brothers Quarry; and H. L. Purtill, superintendent, Granite Rock Co.

#### **Buys Quarry**

BEU LIMESTONE Co., Grundy Center, Iowa, has purchased the quarry operations of Waterloo Dredging Co., Waterloo, Iowa. Owners of Beu Limestone Co. are George Herman and Paul Beu, Waterloo, and Lee Page and Holis Miler, Grundy Center. E. H. Matthias, owner of Waterloo Dredging Co., stated his firm would continue its sand, gravel and asphalt business.

#### **Cover Picture**

THE PLANT OF BLACK WHITE LIME-STONE Co., Quincy, Ill., illustrated on this month's cover, is supplied rock



from an underground operation. Equipment used in this operation includes a Caterpillar diesel D6 tractor with bulldozer, a D4 tractor with Link-Belt loader and a Lorain

shovel powered by a D315 Caterpillar engine. The plant produces agricultural limestone and various crushed stone products. It is affiliated with Calcium Carbonate Co., Chicago, Ill. The Black White Limestone Co. is one of the larger producers of agricultural limestone in central Illinois.

#### **Record Lime Shipments**

PRELIMINARY FIGURES compiled by the Bureau of Mines indicate that lime shipments in 1951 reached an all-time high, exceeding the previous record year of 1950 by over 10 percent. Shipments increased from 7,478,000 tons in 1951. The greatest increase was in chemical lime and second, refractory lime. Shipments of agricultural and building lime remained about the same. The greatest proportionate amount of the increased tonnage was for quicklime rather than hydrated lime.

#### Bentonite

At a recent meeting of the South Dakota Natural Resources Commission, Ben Arthur, manager of a bentonite plant at Belle Fourche, S.D., reported that the bentonite deposits of South Dakota are nearly depleted. Approximately 9575 carloads of bentonite were shipped from Belle Fourche last year.

#### COMING CONVENTIONS

May 13-15, 1953-

National Industrial Sand Association, 18th Annual Meeting, The Homestead, Hot Springs, Va.

June 8-10, 1953-

National Lime Association, 51st Annual Convention, The Homestead, Hot Springs, Va.

June 12-14, 1953-

Concrete Products Association of Washington, Annual Summer Meeting, Monticello Hotel, Longview, Wash.

# INTS and ELPS PROFIT-MAKING

PROFIT- MAKING IDEAS DEVELOPED BY OPERATING HER

#### Removing Troublesome Shale

Back rippers mounted on a bulldozer blade have proved the answer to the troublesome problem of removing thin layers of shale covering lime stone deposits at the Louisville Crushed Stone Co. mine in Louisville, Ky.



Back rippers, attached to back of buildozer blade, break up the shale

One of the company's recent problems was the removal of a 7- to 9-ft. thick layer of shale from the top of the limestone deposit. The bulk of the shale was removed by blasting. However, after the blasting, there still remained this troublesome layer that was from 3 to 18 in. thick.

To solve this problem, Preco back rippers were attached to the bulldozer on a Caterpillar D8 Tractor. This unit would break up the shale while backing up, then reverse its direction and doze the waste material into a pile where it could be shove!- loaded into wagons for removal from the mine. This ripping process is said to have accomplished in one hour what it formerly took a drill two days to do. The back rippers were first called into service last year to remove a vein of soapstone of about the same thickness as the shale.

Another use this company has found for the back ripper is to loosen agricultural limestone, or dust, which is stockpiled at its processing plant. In storing this agstone in large piles, the dump trucks must be continually running over the pile. This packs down portions of the pile so that it cannot be easily removed. Formerly these portions were loosened up by blasting. Now the back rippers are used to break it up so that it can be loaded for shipment.

#### **Recovering Fines For Sand**

THE PROBLEM of recovering more and more fines for sand is not confined to any one section of the United States. The shortage in fines stems primarily from rigid specification requirements which increasingly require more and more scrubbing and washing, thereby losing in wash waters the very material most needed. One operator successfully recovers fines by the following method. All waste waters from sand-recovery units, rinse screens, etc., are collected and spouted to a 4- x 40-ft. drag-type, dewatering unit which is shown in the illustration. The drags move in the 8-f.p.m. range. The slow movement and size of the unit greatly reduces turbulence, resulting in the settling out of the fines which are recovered



Fines are recovered by drag-type, dewatering unit

by the drag, Some 3 to 5 t.p.h. are thus added to current production. However, another operator who tried this same method ran into difficulty because small wood chips, roots, etc., also settled out with the fines, raising the organic content of the sand. The sands at the latter operation, however, came from a river deposit that was refilled each season by flood waters. Flood waters brought down the lighter materials and pool eddies caused settlement and final deposit contamination.

#### Segregation Eliminator

THE ILLUSTRATION shows a reciprocating car-loading chute used at a western aggregate operation. The chute reciprocates at right angles to the long axis of the gondola and receives its reciprocating motion from

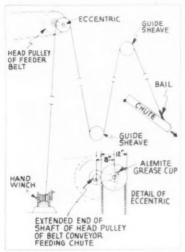


Broken chunks of shale are dazed into pile for shavel-loading into wagons for removal from the mine



Reciprocating chute at car-loading point

a company-designed eccentric which is fastened to the outboard end of the shaft of the head pulley on the feeder belt. The eccentric arm has a stroke of about 8 in., with a free-running, 12-in. dia. sheave on the outboard end of the eccentric. A bail is on the end of the chute to which is fastened a  $^3_4$ -in. steel cable that goes up and over the sheave on the eccentric. Two stationary, intermediate guide sheaves

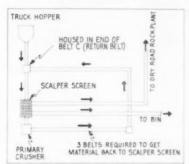


Sketch showing details of pulley with eccentric mechanism which gives reciprocating motion to car-loading chute

are used, as shown in the line drawing. The other end of the cable is fastened to a small hand winch at ground elevation. To stop the chute's action, the hand winch is used to raise the chute up against the side of the supporting structure. A little slack in the steel cable then stops the reciprocating motion without need of stopping the belt conveyor. Cars are spotted with an industrial Brownhoist.

#### Primary Crusher Set-Up Uses Many Belts

A LARGE SAND AND GRAVEL PRODUCER who likes to keep all phases of his plant close to the ground, produces washed gravel, washed crushed gravel, crusher-run, and road rock in all



Details of primary crusher set-up



Three off-bearing belts serve primary crusher

desired sizes. Such an operation requires the use of a lot of conveyor belts. The illustration shows his primary crusher set-up, using a 10- x 36in. Kue Ken primary and a 5- x 10-ft. El Jay scalper. Three off-bearing belts serve this assembly. One belt carries the material from the scalper to a steel bin where the material can be diverted to the washing plant for crushed or uncrushed gravel, or can be shipped for road rock and/or crusher run. The throughs from the primary crusher are returned to the primary belt by three off-bearing belts, or this material can go to the dry road-rock plant which includes secondary crushing units. The "doghouse" at the left, over the primary belt, is an enclosed hopper that receives returns from the primary crusher.

#### Recovering Gold From Sand and Gravel

MANY SAND AND GRAVEL DEPOSITS in the Carolinas, California, Michi-

gan, Wisconsin, Alabama, Georgia, Missouri, and other states, often contain traces of gold. Most plant operators feel, however, that the cost of separating the gold from the sand and gravel could not be justified in terms of profitable operation.

The editor of Rock Products some time ago received a letter from Vincent B. Sadowski of Excelsior Products Co., 11000 E. McNichols Rd., Detroit 5, Mich., stating that he had invented a separator, an oscillatingtype machine, powered by a gas engine (see illustration). Samples of South Carolina sand and gravel were used in testing the machine for operating results which were said to be quite satisfactory. The inventor plans to place the machine on the market for sale to small operators and prospectors for separating and recovering gold and uranium, and he has suggested that sand and gravel producers who think they might have traces of gold in their material might submit samples of the product to him for testing.



Machine for separating gold from sand and gravel

# TETT

# Machinery

# Sammer of the same of the same

#### Maintenance Impact Tool

SYNTRON Co., Homer City, Penn., has introduced an electric impact tool for use in removing bolts up to % in., as a tapping and threading medium,



Electric impact tool for many machine maintenance jobs

for drilling and many other maintenance applications. When the torque load on the drive spindle builds up to a certain point, the rotary action is converted to 2000 impacts per min., thus providing a continuous motor run. The normal clockwise rotation can be changed by turning the rearend cap. Weighing 6% lb. with a Universal a-c, d-c motor for 115-volt operation, it has a variety of accessories, including sockets, bits and chuck adapters.

#### Jaw Crusher

PIONEER ENGINEERING WORKS, 1515 Central Ave., Minneapolis 13, Minn., has announced the addition of a 42-x



Overhead eccentric jaw crusher has 4-cu. yd.

48-in. overhead eccentric jaw crusher to its line of crushing equipment. The machine, weighing over 94,000 lb., is equipped with self-aligning roller bearings which can be removed from the shaft hydraulically. It has a crushing chamber exceeding 4 cu. yd. and a double wall base which is built in an upper and lower half for lifting and lowering with standard equipment. Adjustments permit an opening at the jaw bottom from 4 to 13 in. for use in large installations requiring high feed tonnage.

#### **Tilting Tower Loader**

BAKER-LULL MANUFACTURING Co., 314 W. 90th St., Minneapolis 20, Minn., has combined a tilting tower with handling attachments, to its Universal loader, available in 2500-,



Loader model with tilting tower

4000- and 6000-lb. capacities. High flotation pneumatic tires, high underclearance and axle oscillation are included with a low gravity center to permit operation under mud, snow and uneven ground conditions. The tilting tower has provisions for digging, dumping, loading and unloading in forward-tilt position, and in backward-tilt for eliminating spillage and balancing the load. Lifting height of the largest model is 100 in. with higher lifts optional. Among the various handling attachments provided with the loader are adjustable lifting forks, material bucket, bulldozer blade, crane lifting hook and gas-powered sweeper.

#### V-Belts For Variable Speed

U.S. ELECTRICAL MOTORS, INC., Box 2058, Los Angeles 54, Calif., has made an improvement in its line of V-belts for variable speed motors. For use in motors up to 50 hp., the double-ribbed belt is designed for smaller diameters and high speeds while reducing friction and allowing flexibility. Synthetic fiber is used in its construction and permits the use of smaller cords to reduce heat. The varibelt is completely enclosed to protect it from drippings, heat, oil and grease.

#### **Emergency Lighting Unit**

GENERAL SCIENTIFIC EQUIPMENT Co., 2700 W. Huntingdon St., Philadelphia 32, Penn., has brought out an



Automatic emergency lighting system

automatic emergency lighting unit for stand-by service in case of power failure at plants, etc. It is powered by a built-in storage battery with an automatic trickle charger. Ready to plug in any a-c circuit, the lights are sealed beam, of 100 c.p., and are designed to provide ten hours of light.

#### Rock Drill

INGERSOLL-RAND Co., Dept. RD, 11 Broadway, New York 4, N.Y., is manufacturing the JR-38 Universal jack-drill, which may also be used as a drifter, stoper or jackhammer. Features include controls in fixed position on the drill backhead; five-position throttle; adjustable balance; constant chuck blowing; and air connection through the mounting support, eliminating separate air hose to the feed leg.

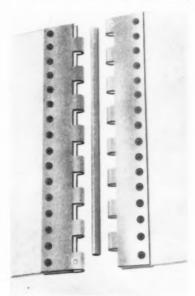


Flexible-type rock drill with controls on backhead

#### - NEW MACHINERY -

#### **Belt Splicer**

TENNEFOS MANUFACTURING Co., Moorhead, Minn., is now producing a belt splicer for trough-type belts,



Splicer for trough type belts

in addition to its line of flat-belt type splicers. The splicers are available for various widths of belt and are said to provide longer life for belts and ease of installation or uncoupling.

#### Photo Service

SEQUENCE PHOTO SERVICE, 705 Tatnall St., Wilmington 1, Del., has been established to take machine-gun sequence blasting photos at quarry, stripping and construction operations. Photo service contracts are available to operating companies, consulting engineers, seismograph organizations and explosives suppliers. The photos are considered helpful in analyzing reasons for escaping gases, noise, certain types of breakage, and the effectiveness of various millisecond delay patterns. There are an average of 10 to 12 photos in each sequence, which are taken at the rate of three photos a second. Information on the service may be obtained by writing the company.

#### **Tamping Plugs**

NATIONAL MINE SERVICE Co., Beckley, W. Va., has discovered a means of cutting stemming time through the development of its Quick-Seal tamping plugs. The plugs are made in two parts: a cylinder of asbestos paper, accordion-crimped and formed into a hollow, thick-walled cylinder held in shape by a glued paper band; and a conical wooden wedge. They are available in 1½-, 1½-, 1¾-, 2-, and 2¼-in. diameters. The procedure applied in

using the tamping plugs is: (1) the explosive charge is placed into the borehole; (2) the tamping plug is inserted into the hole against the charge; (3) the wooden wedge is driven into the expanding part of the plug with a tamping stick; and (4) when a ringing sound is heard, the wedge is as tight as it should be and the hole is sealed.

#### **New Belt Conveyor System**

A NEW BELT CONVEYOR SYSTEM, which is said to weigh material and then calculate the tons per hour it carries, is being produced jointly by the industrial division of Minneapolis-Honeywell Regulator Co. and Trans-Weigh Co.

The system was said to operate as follows: the belt rides over a set of rollers and the force exerted on the rollers is measured by a gauge; weight of the belt is subtracted electrically; the final measurements are fed into an electronic recorder which indicates both the flow at the moment and the total amount that has passed over the belt. It is also claimed that the system can control the blending of several different materials on the belt.

Delivery of the unit is scheduled for sometime next spring and the device will sell for approximately \$3500.

#### **Dump Body**

The Galion Allsteel Body Co., Galion, Ohio, has designed a 20-ton capacity, tandem axle, straight-bed dump body, which is known as the "Morgantown." The body, constructed of 10-gage steel with a full size cab protector, is reinforced with six steel V-type braces and has a double-acting tailgate. Its dimensions are an overall



Truck-mounted dump body of 20-ton capacity

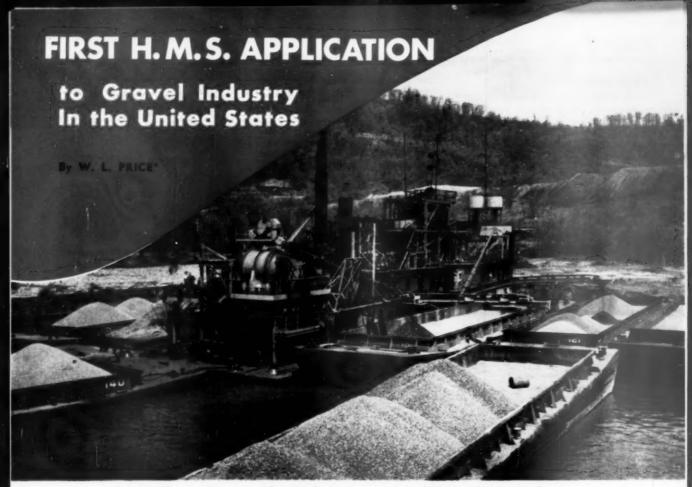
length of 20 ft., 84 in. wide at the floor level and 95½ in. wide at the point where side boards are inserted. The ends have box-type corner posts which anchor the two removable steel side boards. Dumping is handled by a Galion model 77353 hoist.

#### Large Carrier Truck

DART TRUCK Co., 2621 Oak St., Kansas City, Mo., has announced production of its 60-ton, model 600 truck which is designed as an off-the-highway unit to work in conjunction with the largest shovels in use today. Power is provided by two diesel engines, totalling 700 hp., mounted beneath the truck body on either side and connected to the rear axles through separate torque converters. Twin doubleacting hydraulic boosters provide 56,-000-lb. steering effort; the twin hydraulic hoists of 1000-p.s.i. pressure have a built-in snubber and pull-down mechanism; and a 34-gal, liquid cooling system is connected to each engine to dissipate engine and torque converter heat.



Truck emptying 75-ton payload



End view of heavy media separation plant. Note loading conveyors placing finished gravel into barges alongside

To IMPROVE THE QUALITY of river gravel for use as aggregate in concrete, the Dravo Corp. has been active in research for several years. Constant detriments to the attainment of this desired quality were the objectionable particles of "soft" gravel, porous gravel, and foreign materials, such as coal, wood, and clay. "Soft" gravel similar to loosely bound sandstone caused a high loss in the Los Angeles rattler test' and broke up in the sodium sulfate soundness test. Mechanical means of "scrubbing" or pulverizing these particles in rotating cages with and without ball charges had been tried for years with high maintenance cost and only partial success. It became imperative to develop a new process for removal of these objectionable particles of

After learning of the success of the Royal Canadian Air Force in removing shale particles from their gravel by means of the differences in specific gravity (shale—sp. gr. 2.0, gravel sp. gr. 2.4 to 2.9), a preliminary study was made of samples of the Dravo gravel deposit by sorting out individual particles by specific gravity (see Fig. 1). This study indicated,

\*Engineering Manager, Keystone Division, Dravo Corporation. first, that there was a variation in specific gravity of the deposit and, secondly, that in general the softer or more undesirable gravel lay in a lower range of specific gravity than did the harder material. With this encouragement, a sample of 40 tons was sent to the American Cyanamid Co. for a run through their laboratory heavy media separation plant.

It might be well to define heavy media separation at this point. This process consists of placing the feed material to be separated into an artificial heavy liquid made up of finely ground material kept in suspension in water by constant agitation. In most cases, either magnetite (Fe<sub>2</sub>O<sub>3</sub>) or ferrosilicon (FeSi) is used in various gradations to suit the separation.' For example, if finely ground magnetite (sp. gr. 4.9) is kept suspended in water (sp. gr. 1.0) in the ratio 75 percent to 25 percent by weight, a resulting fluid of 2.5 sp. gr. will result which will float off all lighter substances. It can be seen that by varying these percentages of magnetite and water, a mixture of any specific gravity between 1.0 and about 2.5 to 2.6 can be produced. For liquids with higher specific gravities, ferrosilicon (sp. gr. approx. 7.0) can be used. Once the feed is separated

into a float and a sink product, the magnetite is removed by drainage and washing, recovered magnetically, and reused. This must be done by screening, and the finished product, sink or float, can be loaded at this point. This briefly is the essence of heavy media separation and the process is used to separate various products, such as slate from coal, gangue from iron ore, and many other useful separations.

At the American Cyanamid Co. laboratory, the gravel sample was separated at operating specific gravities ranging from 2.30 to 2.50.° Fig. 2 indicates the percentage of sink and float at these gravities. Exam-

Los Angeles Rattler Test – A.S.T.M. C-131.
 Sodium Sulphate Test Simulates a Freezing and Thawing Action – S.S.T.M. C-88-46T.

Mining Process Applied to Runway Construction, by S/L C. V. Trites, M.E.LC., and S/L J. D. Shannon, Air Material Command, Royal Canadian Air Force, 1949.

Typical Cumulative Sieve Analysis of Ground Magnetite: No. 38 M. -5-8 percent, No. 100 M. -15 percent, No. 325 M. -70-75 percent.

<sup>5.</sup> It should be noted that operating specific gravity must be distinguished from true specific gravity. True specific gravity can be determined by use of a heavy liquid issee distribution curve Fig. 1) while operating specific gravity is a test figure obtained by weighing a measured sample of the media. This will vary depending upon where the media sample is taken. For a comparison of these two terms, see Fig. 2.

Keystone Division, Dravo Corp., builds separate hull for heavy media separation plant which is lashed to one end of dredge. New plant removes soft and porous gravel and foreign materials, such as coal, wood and clay, to improve gravel quality

ination of the float product showed again that the soft objectionable particles predominated in the range of low specific gravities. Los Angeles rattler tests run on these samples gave results as indicated in Fig. 3. Here it will be noted that by increasing the specific gravity, it is possible to improve the feed from a 38 percent loss to a 28 percent loss, considerably below the allowed 35 percent. The high rattler loss on the float product indicates the soft quality of the gravel removed.

Improvement of the gravel as determined by the sodium sulphate test is graphically illustrated in Fig. 4. Note the improvement by reduction of the loss as the specific gravity of separation is increased, running well below the allowable 10 percent. The high loss on the float gravel again is an indication of the inferior quality of the gravel removed from the loaded product. One other indication of improvement is shown in Fig. 5 which reveals a reduction in percent of absorption of the sink product as the specific gravity increases.

#### **Design of Plant**

The results of these tests provided the only data of its kind on gravel. It proved encouraging enough to study further the construction of a heavy media separation plant. At present, the gravel is dredged from the Ohio River, screened, and the finished products loaded into barges. A land plant

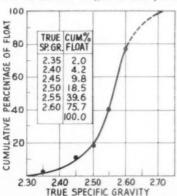


Fig. 1: Distribution curve of gravel deposit



Side view of heavy media separation plant. Dredge proper is to the left with the H.M.S. plant lashed to hull, shown to the right

layout was discarded due to the market location which favored a unit at the dredge with greater flexibility and no lost time and expense on double handling of material to and from

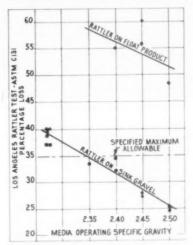


Fig. 3: Abrasion test on H.M.S. gravel from pilot plant run

the plant. Serious consideration was given to remodeling the existing Dredge No. 9 to include the heavy media process within the existing flow scheme. However, this idea was abandoned for several reasons: namely, the dredge could not be taken out of production for the length of time required for alterations; secondly, being a new application of the heavy media process, no operating data was available and much experimental work was needed which would slow down necessary regular production of gravel.

It was decided, therefore, to use a separate floating heavy media plant lashed to the dredge and fed by conveyors. There were numerous difficulties involved. One was to get all the necessary equipment on a small hull in the proper location in the flow scheme. The other was the question of the stability of a small floating hull and its possible effect on the process. These and other serious problems were resolved and the first floating heavy media separation plant was then designed and built by the Engineering Works Division of Dravo Corp.

#### **Specifications**

The equipment and structure were mounted on a specially designed hull-50 ft. wide, 40 ft. long, and 7 ft. 6 in, deep. The hull is subdivided into 14 water-tight compartments around the perimeter so that any one compartment could be flooded without sinking the plant. The plant is fed by a 24-in. conveyor belt, on 100-ft. centers, extending from the former loading point on the dredge to the feed hopper at the top of the new plant. The finished gravel product is loaded onto two 500-ton capacity barges moored alongside. The waste product can either be wasted back into the river or dumped onto a con-

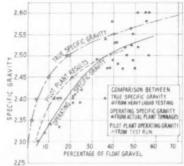


Fig. 2: Percentage of float vs. specific gravity. Points for operating specific gravity were obtained by weighing timed samples of sink and float

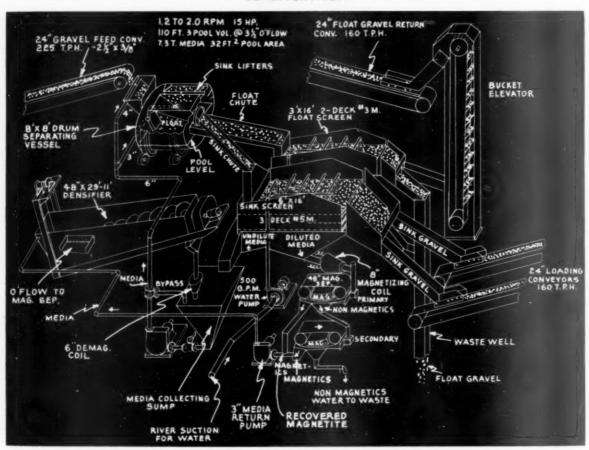


Fig. 6: Flow diagram of floating heavy media separation plant

veyor belt leading back to the crusher on the dredge for crushing to sand the latter being an experimental feature.

The general layout permits loading practically any combination of barges from the dredge and heavy media plant with quick change-overs from one to the other.

The feed to the plant is ordinarily either or both of these sizes of gravel,  $2^{4}$ <sub>2</sub> x I in. and  $1^{4}$ x 3% in. depending on the production requirements. The plant is designed to handle a maximum of 225 t.p.h. with an average feed of about 150 to 175 t.p.h.

The flow of gravel through the plant can be observed in Fig. 6. The feed is supplied by the aforementioned 24-in. conveyor belt. This is dumped into an 8- x 8-ft. Wemco drum separator revolving at about 2 r.p.m. The drum is filled one-third full of the heavy media pumped by a 6-in. Wemco glandless pump. On entering the media, the light particles of gravel float on the surface of the liquid and out the end of the drum and onto a chute, then to the 3- x 16-ft. twodeck float screen. Meanwhile, the heavier particles sink to the bottom of the drum and are bailed out by lifters on the drum periphery. This

sink product is dumped onto a collecting pan and flumed to the 6- x 16-ft. sink screen.

On both screens, the setup is similar. The first portion of the screen has no sprays and about 95 percent of the media drains from the gravel here, drops through the screen into the media collecting sump and back into the main 6-in. pump where it is sent back to the drum to repeat the cycle. The small amount of media that clings to the gravel is washed off by fine water sprays supplied by a 500 g.p.m. pump. This diluted media washes through the screen and flows to two 48-in. Wemco belt-type magnetic separators in series where the magnetite is recovered magnetically and the water is wasted overboard. The recovered magnetite is then pumped by the 3-in. Wemco media return pump to the 48-in. x 29-ft. 11-in. Wemco densifier where it is dewatered to the desired percentage of moisture and dumped back into the circuit at the sump. This completes the media circuit.

The gravel is carried across the screens with the float gravel either dropping into a waste well or being returned to the dredge for crushing to sand. The sink gravel is separated

and blended back in proper proportions and two different sizes are chuted onto the 24-in, loading belts to the barges.

#### Performance

This plant was put in operation in April of 1952 and started production in May, operating through the 1952 season. In this short period of operation, it is impossible to fully evaluate the improvement of the gravel. The plant has lived up to expectations thus far. Rattler tests have been improved sufficiently to supply aggregate where a 35 percent rattler loss is permitted. The results of the sodium sulphate soundness test indicate a very comfortable margin of safety. In general appearance, the gravel has improved tremendously with all foreign material entirely removed. One added feature of this plant is that it will permit dredging for gravel in contaminated areas previously rated unusable. This applies particularly to streaks of granulated coal found in the deposit as well as other deleterious material. In a deposit where the gravel needs no real improvement but is contaminated with coal, the operating gravity may be lowered to 2.10 to 2.20 for removing coal and wood only.

Further tests on processed gravel are being run to make available more complete data on this process.

#### **Plant Operation**

The plant is designed for a oneman operation. The operator's only fixed duties while operating consist of checking specific gravity of the media and making the necessary adjustments. The gravity is checked by weighing a measured sample of media on a beam balance which reads specific gravity directly. The remainder of the operator's time is spent in lubrication and maintenance.

The total power requirement for the plant is about 90 to 100 kw, including conveyors.

The estimated magnetite loss is about 1 lb. per ton of gravel feed. Ground magnetite is available at a cost of about \$40 per ton delivered.

Repairs have been minor thus far. Media piping suffer from some abrasion which occurs most at elbows, turns, and other places which cause turbulence. A recent development in the field is the use of rubber hose for pipe bends. All piping bends should be designed for the minimum of turbulence and sharp bends. The only other major maintenance item has been occasional replacement of screen plates.

#### Summary

At this early date, the heavy media separation plant gives every promise of proving to be a major improvement in the production of high quality gravel.

Due to the specific operating requirements, the plant described would be more costly to erect than the land plant counterpart. After sufficient operating data is accumulated, it will probably be possible to integrate this equipment more directly into the flow scheme of gravel processing with the media recovery screens serving as the final gradation screens. At this stage,

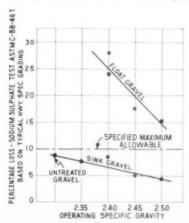


Fig. 4: Sodium sulfate test on sink and float pilot plant run

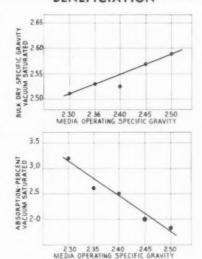


Fig. 5: Absorption curves on H.M.S. samples; above, bulk dry specific gravity of samples

however, this plant is adequately serving its purpose as a pilot plant.

Much additional experimentation is necessary. Although it has proved of value in this particular deposit, each gravel producer, if interested in this process, should investigate carefully the analysis of his particular deposit and check it experimentally before an investment is made in a plant of this type.

This entire project, since it is the forerunner in the gravel industry, will offer much in the way of working data on the process for this particular application. In the future, with the average gravel producer being forced to work less desirable gravel deposits, this process could prove to be the only practical way to produce sound aggregate from these poorer deposits. In any event, its contribution to practical research is a sizeable one.

### Discuss Aggregate Specifications

CALIFORNIA PRODUCERS of crushed rock, sand and gravel met with state highway engineers of the California Division of Highways, in Sacramento, Calif., on December 2, 1952, to discuss proposed changes in specifications relating to aggregates. Representatives of the larger producers from both southern and northern California were present. The southern group was headed by H. G. Feraud, executive secretary for the Southern California Rock Products Association.

Last fall the highway engineers submitted to the producers a list of the proposed changes. The producers held a meeting in San Francisco on November 20 to discuss the proposed changes and to make certain recommendations which were accepted by the state highway engineers.

Section 19, relating to "plant-mixed cement treated base" and a hauling time of 1 hr. and 30 min. for spreading, and 30 min. for compacting, or an over-all time of 2 hr., was tentatively adopted. It was also indicated that "crusher-run base" would be retained as some producers had installed slurry plants to prepare that material. Also city and county engineers' use of this material might be affected if the specification were eliminated from the new specification book. The expected discussions relating to the new "sand equivalent test" did not develop and the new test will be a part of the new specifications. It appears that the test will not work any hardship on the established producers. It was also decided that the method of producing an aggregate should be left entirely to the producer.

#### **Crushed Stone Production**

Over 250,000,000 tons of crushed and broken stone, in addition to that used for making cement and lime, were produced in the United States during 1950, as reported in the Bureau of Mines' Minerals Yearbook. This record output represents a 13-percent increase in quantity and a 15-percent increase in value over the previous year. Tonnage increases were reported for all classifications except riprap and agricultural stone which decreased slightly. The average value was \$1.33 per ton, a 3-cent gain over 1949.

Crushed and broken stone, sold or used by producers in the United States, according to principal uses, were listed as follows:

Use	Short Tons	
	1950	1949
Concrete and road metal	147,107,670	124.367,210
Railroad ballast	18,614,040	17,054,180
Metallurgical	35,969,820	80,752,320
Alkali works	6,174,350	6,022,240
Riprap	6,898,050	7,568,390
Agricultural	19,348,820	21,482,910
Refractory (ganister, mica		
schist, dolomite, soapstone)	2,158,000	1.827,630
Asphalt filler	750,050	671,560
Calcium carbide works	749,930	652,950
Sugar factories	717.620	555,030
Glass factories	769,680	621,840
Paper mills	431,940	417,850
Other uses	10,563,880	10,414,030
Total	250,253,850	222,408,140
Portland and natural cement		
and cement rock	59,361,000	55,219,000
Lime	14,980,000	12,637,000
Grand total	324,595,000	290,264,000

### SAND AND GRAVEL PRODUCERS

#### **Discuss Important Current Problems**

San Francisco convention of industry emphasized merchandising, zoning, labor relations, public relations, production, specifications, safety, costs and percentage depletion

MORE THAN 1400, including some 400 wives, attended the 37th annual convention of the National Sand and Gravel Association and the 23rd annual convention of the National Ready Mixed Concrete Association, held at the Fairmont Hote!, San Francisco, Calif., February 23-26. This was an unusually large turnout for a nonexposition year but the program was excellent and well publicized in advance of the convention and many who came to San Francisco took advantage of the opportunity to have a few days of vacation before or after the meetings.

A large group came by special train out of Chicago which enabled them to stop off at Grand Canyon, Hoover Dam and other points of interest enroute. In addition, the Rock, Sand and Gravel Producers Association of Northern California and the Northern California Ready Mixed Concrete and Materials Association had arranged a post-convention trip to Monterey and Carmel. Others went on to Hawaii.

The 1954 conventions of the two associations will be held in connection with the biennial machinery exposition at the Conrad Hilton Hotel, Chicago, Ill., February 15-19, with the convention of the National Crushed Stone Association to be held the following week. In 1955, they will meet without exposition, January 9-13, in Miami, Fla., with the 1956 conventions and exposition tentatively scheduled for Chicago. The 1953 semiannual meeting of the two boards of directors will be September 28-30 at the Broadmoor Hotel, Colorado Springs, Colo.

#### Program

This year's program was crowded into two and one-half days, with the fourth set aside for an all-day field trip to two of the largest and most modern sand and gravel plants anywhere. The boards of directors had a joint meeting starting with breakfast on the opening day. With the exception of the first afternoon joint session, there were simultaneous sessions each day, all sessions being for both industries except on the closing afternoon when there were separate meetings for the two associations. According to established practice, the program was made up principally of

men from within the industries themselves.

Among special sessions were the annual business meeting of the Manufacturers Division starting with breakfast and a breakfast meeting of the Ohio Ready Mixed Concrete Association.

There were no scheduled social functions in order to permit individuals to make their own entertainment plans in the convention city. Each day there was a "hospitality" hour starting at 5 p.m. to which all at the convention were invited to become acquainted and make their arrangements for dinners and entertainment. There was one scheduled joint luncheon which heard an excellent talk about California—its history, growth and potential—by Louis B. Lundborg, vice-president, Bank of America, San Francisco, Calif.

Edmond F. Brovelli, Basalt Rock Co., Napa, Calif., was presiding officer for the joint session opening the convention. Following a prayer by member Ezra C. Knowlton and the welcoming remarks by Mr. Brovelli, he asked the audience to rise in tribute to those who had passed away during the past year. They were J. C. Buckbee, Glendale, Calif.; Henry Jaeger, president, Jaeger Sand and Gravel Co., W. Allis, Wis.; Charles S. Dickson, Standard Sand and Gravel Co., Wheeling, W. Va.; Ray V. Warren, secretary, Western Pennsylvania Sand and Gravel Association, Pittsburgh, Penn.; W. H. Gemmer, chair-Texas Construction Material man. Co., Houston, Texas; and C. S. Hunt-



President A. R. Shiely of N.S.G.A., left, with retiring president R. K. Humphries of N.R.M.C.A. Mr. Humphries was one of the California hosts and was on the spot at his company's Eliot plant to answer questions

ington, Link-Belt Co., Chicago, Ill., a past chairman of the Manufacturers Division.

Then followed the addresses of the presidents of N.S.G.A. and N.R.M.C.A., a talk on the construction requirements in California and one by executive secretary V. P. Ahearn on the new administration and the new Congress.

President A. R. Shiely of N.S.G.A. was presiding officer for a joint session that had talks on truck mixer tests, factors to consider in buying ready-mixed concrete equipment, specifications and inspection for aggregates and ready-mixed concrete.

John W. Murphy, Spokane, Wash., presided for a joint session that heard two papers on group bargaining in labor disputes and one on the group insurance program of the N.R.M.C.A. Richard K. Humphries, president of N.R.M.C.A., presided for the one joint luncheon.

A joint technical session covering production and specifications was presided over by E. K. Davison, Pittsburgh, Penn. The talks covered the use of the heavy media process in gravel production, laboratory tests of gravel so treated, the annual report of engineering director Stanton Walker, and an open forum discussion of operating and specification problems.

Percentage depletion, cost accounting and industrial radio were covered in a joint session under the chairmanship of J. Rutledge Hill, Dallas, Texas.

Four excellent papers on merchandising and the annual report of the executive secretary came under a joint session with Quentin W. Best as chairman. H. G. Feraud, secretary of the two southern California associations, presided over a joint session covering talks on the functions and activities of state and regional associations at which four papers were heard.

President A. R. Shiely presided over a final session for N.S.G.A., when officers were elected and the safety trophies were presented. Concluding papers were on the subjects of zoning and pollution problems.

President Richard K. Humphries presided for the final session of N.R.M.C.A. when officers were elected and safety trophies presented. The session concluded with a round-table discussion on cement supply in 1952 and prospects for 1953.

Reports of special interest to producers of ready-mixed concrete, and certain other subjects from the joint sessions are published in the Concrete Products section of this issue of ROCK PRODUCTS, where the principal report of the N.R.M.C.A. convention is published. This report, of the N.S.G.A. convention, necessarily also covers many topics also of interest to ready-mixed concrete producers since they were presented in joint sessions. The separate reports, herein and in Concrete Products within this issue, should both be read for complete coverage.

#### Field Trip

Buses were chartered for an all-day field trip to inspect the Eliot plant of Pacific Coast Aggregates, Inc., and the Radum plant of Henry J. Kaiser Co., which are among the largest and finest sand and gravel plants in the United States. These plants and others in the area were described in the January, 1953, issue of ROCK PRODUCTS, some copies of which were distributed on the buses before the field trip as a guide and which might be referred to if producers wish to check back on what they saw. Separate individual trips were arranged for those who wished to inspect readymixed concrete plants.

#### Officers

Albert R. Shiely, J. L. Shiely Co., St. Paul, Minn., was re-elected president of the National Sand and Gravel Association; John W. Murphy, Union Sand and Gravel Co., Spokane, Wash., was re-elected vice-president; and Roy E. Weaver, Lincoln Sand and Gravel Co., Lincoln, Ill., was re-elected secretary-treasurer.

Howard W. Jordan, Metropolitan Sand and Gravel Corp., Port Washington, N.Y., was elected to the executive committee. Re-elected to the executive committee were Robert H. Baker, Dixie Sand and Gravel Corp., Chattanooga, Tenn.; E. K. Davison, J. K. Davison and Bro., Pittsburgh, Penn.; and E. Phil Gemmer, Texas Construction Material Co., Houston, Texas.

Re-elected directors at large were Charles E. Brady, Lilesville, N.C.; Stephen Stepanian, Columbus, Ohio; J. P. Calhoun, Columbus, Ga.; and C. A. Chipley, San Antonio, Texas. Robert S. Barneyback, Henry J. Kaiser Co., was elected a new member at large.

#### President's Report

President Albert R. Shiely of the National Sand and Gravel Association, in his address before the opening joint session of the two associations, expressed his pleasure at the excellent attendance and the quality of the program as arranged by the staff and by the hosts, the Rock, Sand and Gravel Producers Association of



Left to right: Ed Davison, J. K. Davison & Bro., Pittsburgh, Penn., with president A. R. Shiely of N.S.G.A. and Abe Goldberg of Allis-Chalmers

Northern California and the Northern California Ready Mixed Concrete and Materials Association. He was high in his praise of the work and accomplishments of executive secretary V. P. Ahearn, engineering director Stanton Walker and their staffs in Washington, paid compliment to the publications serving the industry, expressed his appreciation to the board of directors, and referred to the fine relationship that exists between the N.S.G.A., its Manufacturers Division, N.R.M.C.A. and the National Industrial Sand Association.

He said that association finances are in excellent shape and that a substantial surplus had been built as a hedge in the event of business decline. Membership was increased by 19 during 1952 despite the fact that there are no membership campaigns.

Tribute was paid to the standing committees and particularly to J. Rutledge Hill, chairman of the percentage depletion committee, and his committee for outstanding accomplishment.

Mr. Shiely touched at some length on the subject of management-labor relations, since he believes the greatest threat to the nation's welfare comes from the power exerted by management and labor in nation-wide and industry-wide negotiations. This power must be curbed, he said, in making the following suggestions:

- Charter all international unions.
   Revoke the charter and fine any international union that authorizes or contributes strike benefits in more than one state at a time.
- Where labor laws in the state and federal government conflict, the state law will prevail.
- Penalize employers if they lockout their employes in more than one state at a time.
- Make the injunction processes apply equally to strikes and lockouts.
- Prohibit employers from shipping to customers in the state where their employes are on strike or lockout from other plants of the same company in other states.

What Mr. Shiely has in mind is to put collective bargaining on a scale no larger than the geographical limits of one state and to make the rules of that management and labor have a healthy respect for each other.

Mr. Shiely believes that we may look forward under the new Washington administration with renewed hope that the trend toward socialism will



Left to right: Tom Popplewell, Fort Worth Sand and Gravel Co., Fort Worth, Texas; R. K., Humphries, San Francisco, Calif.; R. S. Barneyback, Oakland, Calif., and Quint Best, Los Angeles



Eleven bus loads of producers and manufacturing representatives went on the Radum and
Eliot plant inspection trip

be stopped and that the constitution and our private enterprise system will be preserved. He holds no brief for the philosophy of security instead of opportunity which has been fostered for the past 20 years.

#### **Executive Secretary's Report**

EXECUTIVE SECRETARY V. P. AHEARN presented a very comprehensive report before a joint session of the two associations. To start out, he reported that each of the two associations has a working surplus and is living within its income. He followed with comments on the business outlook for the industry. According to his figures, expenditures for new construction in 1952 exceeded \$32 billion which is 7 percent higher than 1951 and represents a new all-time dollarvolume figure. Geographical distribution was much better than in any recent year which is important to the two industries. Including modernization and repair, a total of about \$40 billion was spent for construction in 1952.

According to Mr. Ahearn's figures, the welfare of some 30 million people is involved in a sound construction program in 1953, reflecting the great importance of construction to the nation's economy. Construction volume in 1953 is expected to equal the 1952 total which level of activity will not nearly overcome the construction shortages in the United States, which

apparently will last for many years to come. The main limiting factor in correcting the tremendous construction deficiency is the availability of funds.

Mr. Ahearn spoke at considerable length on the overall highway picture. He quoted estimates of the U.S. Bureau of Public Roads that about \$50 billion must be spent to bring its highway system up to modern traffic standards and cited figures on vehicle registrations to illustrate how serious the problem of roads has become. It is important that there is a greater public awareness of the highway crisis than ever before, as he said, but the question to be solved is one of finance. However, some progress is being made as indicated by the increased federal aid appropriation to \$575 million for the fiscal years ending June 30, 1954 and 1955 and the increased levies on motorists for large highway projects like the New Jersey Turnpike. Revenues for that turnpike are far exceeding estimates and similar projects are being undertaken in other states. Another favorable factor is that many states

have adopted amendments to prohibit diversion of highway funds and others are considering amendments.

Figures were cited for the accumulated requirements for other types of public works, one being that the country needs to spend about \$10 billion for public schools alone. All types of public utilities have lagged because of the great population growth, as well, all of which indicates a need for great construction activity for the next ten years.

Production and value of sand and gravel in 1951 and 1952 broke all previous records, the estimated figures for 1952 being about 416,000,000 tons valued at about \$333,000,000. Mr. Ahearn believes these figures may even be higher when the final totals are made available. His estimates were based on a 5 percent increase over 1950, in 1951, and a 7 percent increase again in 1952. This continuing heavy demand has, however, made great inroads into reserves of the country and, as a result, Mr. Ahearn said that the country must face higher prices for sand and gravel in the future as operations must be more distant from markets.

Speaking about percentage depletion, he said that it is under heavy attack and the association intends to continue the fight to have these benefits retained. Members were urged to sell their congressmen and senators on their industry and the great need for percentage depletion.

Turning to the production of ready-mixed concrete, Mr. Ahearn referred to the figures published by his office on July 21, 1952, for the year 1951. Reports were received from 691 producers who produced 37,760,191 cu. yd. of concrete valued at \$424,136,796. They used over 50 million bbl. of cement; the average value was \$11.23 per cu. yd., and average production was 54,646 cu. yd. The industry is now using 20-25 percent of the annual production of portland cement, and continues to grow.

Cement supply is expected to be extremely serious again in 1953 and the industry, in many areas, faces the problem of actual survival in 1953. This problem was discussed at considerable length and Mr. Ahearn cited figures to show the extent to which the cement industry is increasing capacity. One optimistic note is that a bill has been introduced in the new Congress which would permit price differentials to meet competition if such differentials are made in good faith. This bill has direct bearing on the cement industry.

Mr. Ahearn reviewed experiences with wage and price controls which, after he made his report, have been removed insofar as they affect the two industries. He then commented on material controls and paid high compliment to those who administered the regulations. The sand and gravel industry has been exempted from rene-



Left to right: T. P. Eldred, Jr., American Hard Wall Plaster Co., Utica, N.Y.; H. H. Kerwin, Eastern Rock Products, Inc., Utica, N.Y.; and Paul F. Jahncke, Jahncke Service, Inc., New Orleans

gotiation but the case for the readymixed concrete industry is still being considered.

Mr. Ahearn reviewed the efforts of the two associations to protect the industrial radio licenses held by member companies and to have more liberal regulations apply to permit more effective use of this valuable tool. The National Sand and Gravel Association has been active throughout its existence in hearings on freight rate increases. Mr. Ahearn mentioned some concessions that have been granted the industry as a result but he warned that the country has not seen the end of ex parte proceedings before the I.C.C. The railroads within the year may file another application for general rate increases. The suggestion was made that producers in the various states appear as a body before their state commissions whenever intrastate rates are to be considered.

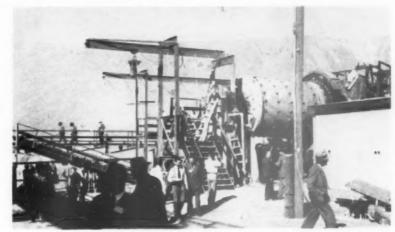
The N.S.G.A. has made a study of the annual cost to the industry of cleaning and repairing cars, with startling results. In 11 months of 1952, 67 reporting companies spent \$490,045 on 402,713 cars at an average cost per company of \$7,314. These figures were not effective in bringing hope for relief when presented to the Association of American Railroads. Mounting freight rate and inadequate car supply are forcing the industry to seek other means of transportation, and water and truck transportation are expected to grow.

The part of the two associations in the application of the Wage and Hour Law was outlined, the associations contending that it was not the intent of congress to apply the overtime provisions of the law to workers where the materials themselves are not moved across state lines. In this issue (Rocky's Notes) is published a very recent decision by the U.S. Supreme Court adversely affecting the two industries.

A summary was presented of the two associations' activities in the field of labor relations. The position is being taken that area bargaining is the only device that is effective in meeting union strength with employer strength, and the techniques for this relatively new and untried practice are to be improved.

Mr. Ahearn summarized the results of the 1951 safety competitions for the two industries, which we cover elsewhere in this report. While urging much greater participation in both contests, he did say that participation is growing and that progress is being made in reducing accidents. Accidents are too costly, in terms of human agony and economical operation, to be tolerated, he said, in urging that member companies seek every means to reduce them.

The group insurance plan for the N.R.M.C.A. was discussed and its advantages pointed out. This program is covered elsewhere in this report, as



Rod mill attracted a lot of interest at Radum plant

outlined by Donald Shepherd of John Hancock Mutual Life Insurance Co.

According to Mr. Ahearn, the great growth in population and the high rate of home building continue to increase the industry's zoning and related activities. He said that producers would be wise to be watchful of all developments in the communi-

ties where they operate and do all they can to establish sound relationships with local governing bodies. Whatever is necessary should be done to establish public confidence in producers' operations.

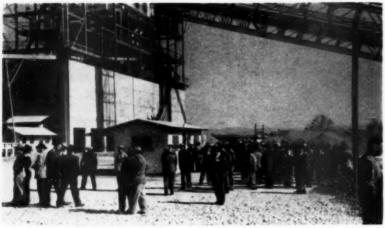
The publication "Standard Clauses for Sales Agreements in the Ready Mixed Concrete Industry" proved



Left to right: H. G. Feraud, secretary, Southern California Rock Products Association; P. J. Akmadzich, City Rock Co., Sunland, Calif.; Bart Carter, superintendent of Radum plant, Henry J. Kaiser Co.; and Stanley G. Marks



Left to right: Ed. Nunan, The Buffalo Slag Co., Inc., Buffalo, N.Y.; H. V. Owens, Eastern Rock Products, Inc., Utica, N.Y.; C. W. Shirey, C. W. Shirey Co., Waterloo, Iowa; Harris N. Snyder. The Buffalo Slag Co.; and Jack Owens, Eastern Rock Products, Inc.



Part of large group gathers around the rest room at the Eliot plant

popular, said Mr. Ahearn, but the time has come to re-publish the outline and to incorporate new ideas, which suggestions he hoped would be forthcoming from a discussion in another session.

Both industries have more state and area associations than ever before which Mr. Ahearn considers very favorable, since the efforts of such groups and the national associations are complementary in serving the industries. The producer has his choice as to whether he will affiliate with his local association or the national, or both, said Mr. Ahearn but he believes the producer should belong to both.

The "Outline Manuals of Cost Accounting" published in 1948 for both industries are in need of review to incorporate new information such as on depreciation, for example, and Mr. Ahearn told of plans to formulate a program of expanded activities in the field of cost determination.

The National Sand and Gravel Association now has 232 active members and 76 associate members which are the largest numbers in its history. National Ready Mixed Concrete Association has 568 active members and 79 associate members which are also new records. In conclusion Mr. Ahearn expressed his appreciation to the of-

ficers, directors, committee members, and to all members and associate members for their friendship and support during the past year.

#### Construction Outlook in California

Speaking before the opening joint session of the two associations, Frank B. Durkee, state director of Public Works, Sacramento, outlined the needed construction in California. His talk, "The Challenge to California," was full of figures that indicate a great potential market for the two industries.

Following his welcome to the audience, Mr. Durkee talked about the need for highways in California. The phenomenal growth of California, both in population and industry, came during the motor vehicle age, he said, and has created a situation unprecedented in history. To point up the problem he quoted an excerpt from Governor Warren's recent message to the legislature, in which the governor termed the state as being one on wheels with its economy built around the motorcar. Most of the natural resources, said the governor, are moved by motor trucks and the dependence of most other activities as well on highway transportation has made an adequate

highway system of greater importance to California than to any other large

An important factor, said Mr. Durkee, has been the unprecedented population growth. Whereas a study in 1946 resulted in a prediction that the state's population would be about 11 million in 1960, that figure was exceeded in 1952 and a census of 15 million is now expected by 1960. Growth is at the rate of 1000 people per day.

The state also has more vehicles per person than before. In 1940 there were 40 vehicles per 100 people and the figure now is 50. About 10 percent of all the motor vehicles in the nation are registered in California. Since 1947, California has acquired one and two-thirds million motor vehicles which is an increase greater than the registration of 41 other states in the country.

The importance of California as a sand and gravel producer was brought out also. Whereas the entire industry had produced a product valued at \$295 million in 1950, the production in California for that year was valued at \$35 million. Thus California was responsible for 12 percent of the national total even though California had only 7 percent of the total population in that year. The high demand for materials in California is appreciated when it is known that about one-sixth of the population increase in the United States from 1940 to 1950 took place in California.

A recent study of California state highway needs made by an independent engineering organization came up with the need for \$3½ billion of construction within the next 15 years, which indicates a requirement of more than 100 million tons of aggregates for state highways alone over the 15-yr. period. In addition, much of the state's 100,000 miles of country roads and city streets is in need of early improvement.

Californians have built 1,600,000 dwelling units since World War II and, this year, 200,000 units or one-fifth the national total, will be started. All forms of construction, including schools, hospitals, prisons and public buildings must proceed on a similar unprecedented scale. School construction at present in California is proceeding at a rate of \$185 million annually. If there is a limit of any kind on California's horizon, according to Mr. Durkee, it is the ability to harness its water supply by large flood control and water conservation projects.

He commented on restrictions to the development of aggregates operations in urban areas and on the subject of specifications. In conclusion, he expressed his appreciation for the close cooperation his engineers have had from aggregates producers and for the progress resulting from research programs of the caliber conducted by the N.S.G.A.



Left to right: Jos. M. Scheinin, James A. Norton, Inc., New York, N.Y.; J. Rutledge Hill, Gifford-Hill & Co., Inc., Dallas, Texas; and Gene M. Mason, Concrete Materials Co., Waterloo, Iowa

#### **Washington Administration**

Executive secretary Vincent P Ahearn, speaking before a joint session, presented an eloquent talk on "The New Administration and Congress." He started off with observations on the new president and the many problems facing the new administration. Mr. Eisenhower, in his opinion, has all the qualities for greatness and will honor his oath of office. He is a man who, according to Mr. Ahearn, does not make his promises lightly and his administration will reflect the highest ideals of public service. He will make his own decisions but base such decisions on a consideration of serving the public welfare. Appointments to public office may be expected to be measured by the qualifications of the men.

Mr. Ahearn commented at great length on the inner workings of Congress and steps necessary in its relation to the administration in order to have an effective overall program. The various top appointments made by the president were discussed, including the Charles Wilson episode. One of the big difficulties, in Mr. Ahearn's opinion, will be in finding men to accept appointments to offices of great responsibility in government services which are in the third or fourth levels of government.

Among difficult problems of the president will be means to clean out corruption in government, the Korean conflict and re-establishment of the prestige and dignity of our foreign policy. Commenting on fiscal matters and the stand of the administration on budgets and taxes, Mr. Ahearn suggested that a cautious outlook be taken in anticipating early reduction of taxes. He believes that the most that business might expect in the immediate future would be the ending of the excess profits tax law by June 30.

Labor legislation will likely be the most important domestic problem to be met and Mr. Ahearn believes the fact that the AFL and CIO do not



Mrs. Stanton Walker, Washington, D.C., left, and Mrs. E. K. Davison, Pittsburgh, Penn., were two of the ladies who made the plant inspection trip.



Left to right: Lawrence Calhoun, son of J. Paul Calhoun (center), Consolidated Gravel Co., Columbus, Ga.; and E. Alvin Goodman, Jr., of B. V. Hedrick Gravel & Sand Co., Lilesville, N.C.

trust each other is favorable. He predicts that the Taft-Hartley Act will not be drastically changed this year or next by the present Congress. Even so, he sees the likelihood of a series of industrial crises because of big unions' demands as they strive to outde each other. If such crises develop as he anticipates, he forecasts the possible to the contract of the

sibility of Congress enacting legislation to reduce the power of unions to terrorize the nation and threaten national defense. While the government is committed to protecting the right of collective bargaining, apparently the unions in question continue to fail to recognize that the rights of all must be protected.

#### **Army Specifications**

R. GILBERT, chief, Concrete Control, U.S. Corps of Engineers, Washington, D.C., gave a talk entitled "Specifications for Aggregates and Ready Mixed Concrete." The speaker said that the Corps of Engineers was the world's largest user of concrete and concrete materials. He outlined the general practices of the Corps of Engineers, devoting some time to descriptive uses of the "Guide Specifications." He said that during the past seven years the Corps of Engineers had used one guide specification for concrete construction on civil works and has relied on the individual field offices to modify the guide so as to consider local job requirements. He said that concrete technology had not reached the conclusiveness of an exact science with definite conclusions, and

that specification requirements must be tempered with judgment based on experience.

Discussing the specific requirements for concrete aggregates, the speaker said:

"The suitability of aggregates is not defined in the specifications by conventional limits for tests such as sulfate soundness, absorption, abrasion loss or allowable percentages of deleterious substances. The use of limits of the conventional type for the control of concrete aggregates is both impracticable and unreliable. For this reason, the determination of the suitability of aggregates in advance of construction has been adopted as the only satisfactory means of assuring that aggregates of acceptable quality will be used. The methods



Irving Warner, Sr., left, with the lacomative engineer's cap that "distinguishes" all his plant visits, with Irving Warner, Jr., center, and E. L. Shoemaker, all of the Warner Co., Philadelphia



Harold Bender, H. C. Feraud and N. J. Redmond, all of Los Angeles

for accomplishing this objective have all been carefully detailed in the Corps of Engineers' 'Standard Practice' manual."

He further said that the Corps of Engineers has sampled and tested materials from thousands of aggregate sources within the past seven years. This program has resulted in the accumulation of a large volume of data on all types of aggregates. In order eliminate unnecessary sampling and testing procedures for future investigations, all of these data have been assembled, combined and published in ten volumes. Each volume represents approximately one-tenth of the area of the United States. Copies of each of these volumes are being distributed to each field office located within the geographical boundaries of the ten zones. Complete sets of all ten volumes will be maintained in the Office, Chief of Engineers, Washington, D.C., and at the U.S. Waterways Experiment Station in Vicksburg, Miss. As additional test results on new aggregate sources become available, these data will be added periodically to the proper volume.



Mr. and Mrs. John T. Sapienza, Washington, D.C., (association counsel) went on the field trip to see for themselves how fast California's sand and gravel deposits are being depleted.

On the subject of general requirements for aggregates, Mr. Gilbert said:

"General requirements common to both fine and coarse aggregates, such as 'composition,' 'quality' and 'sampling & testing' have been combined under a single provision. All sampling will be conducted under a new Corps of Engineers Method, CRD-C100, in lieu of the Federal Specifications SS-A-281a formerly specified. All requirements relative to handling. storage or processing plant, such as rock ladders, sizes of stockpiles or special processing equipment have been deleted. The contractor or supplier may exercise his fullest ingenuity in designing and operating his processing plant to produce an acceptable product. Both fine and coarse aggregates will be checked for compliance with specification requirements "as delivered to the mixer." Gradation requirements for coarse aggregates have not been changed except that a more open gradation has been included in the abbreviated specifications. Gradation requirements for fine aggregates will depend on the type of work under consideration.

"The criterion for selecting the appropriate standard is primarily one of economic justification. Where a large volume of low-cement-factor concrete will be used, it is economically sound to specify close control of fine aggregate uniformity and gradation. This control is essential if consistently workable low-cement-factor concrete will be used. Under such conditions, it is economically sound to specify only moderate control and thereby effect a saving in aggregate production costs. It will be noted that while the permitted variation in the average fineness modulus has been retained at 0.10 for the gradation standard applying to low-cement-factor concrete, it has been increased from 0.10 to 0.15 for most concrete work. (All reference to fineness modulus requirements have been deleted from the abbreviated specifications). None of the fine aggregate gradation standards as shown are manda-

tory. Field offices are permitted to investigate the possibility of changing standard gradations slightly by selecting limits which will permit the economic production of a well-graded sand with a minimum of waste. This policy does not contemplate, however, using a 'pit-run' material or employing 'gap-grading.' A 'particle shape' requirement has been added to the specifications and the number of flat and elongated particles permitted in any separate size group of coarse aggregates has been limited to 25 percent. A simple method (CRD-C-119) has been devised for field determination of flat and elongated particles. In general, this requirement will not apply to projects using bar or terrace gravels. The only remaining requirement pertaining to concrete aggregates that will appear in contract specifications is the one pertaining to the moisture content of the fine aggregates and the smallest size group of coarse aggregates. Normally, these aggregates will be required to remain in free-draining storage 'at the site' for 72 hr.-prior to use to effect this control. On large projects, where the use of low-cement-factor concrete is contemplated, a much more rigid moisture control requirement is required. Here, the moisture content of the sand and of the smallest size group of coarse aggregates must remain between specified limits and will not be permitted to vary more than 0.5 percent in any one hour or more than 2.0 percent during any 8-hr. operation. It is recognized that this requirement is extremely rigid. Restrictive control of moisture content is mandatory if the control of low-cement-factor concrete is to be accomplished. The contractor or producer may use any method or combination of methods at his disposal to accomplish this control.

The speaker said that the fineness modulus of sand for mass concrete where 2- or 2½-bag mixes are used had been changed from a spread of 2.4 to 2.9 to a spread of 2.3 to 2.8 as the low cement factors required closer size control and shape. However, this applies only to low-cement-factor-concretes.

On the specific requirements for use



Anson S. Blake, Blake Bros. Co., Richmond Calif., left, and Merrill Allen

of ready-mixed concrete on Corps of Engineer jobs the speaker said:

Whether ready-mixed concrete is used on Corps of Engineers construction projects will depend largely on job conditions. In general, ready-mixed concrete may be used for structures to be built within or near corporate limits of towns or cities where suitable ready-mixed concrete plants are located and where it is impracticable because of space limitations, to provide 'on-site' batching and mixing plants. Before ready-mixed concrete is approved for use, Corps of Engineers personnel will verify that the proposed plant and processes used in storage and handling of materials and in batching, mixing and transporting the concrete are such that adequate control can be exercised and concrete of satisfactory quality can be produced. Such verification will be based on actual inspection of plant facilities and operations, together with an examination of the history of plant procedures and results .

On the subject of batching equipment in general, he said:

"Cumulative batch plants will be permitted for future work provided the maximum size of the coarse aggregates used in the concrete does not exceed 11/2 in. if it is separated on the %-in. screen or 2 in. if it is separated on the 1-in. screen. Nontilting mixers, including truck mixers, are prohibited for use when the maximum size of the coarse aggregate to be used exceeds 2 in. The cumulative batch plant will be required to have facilities for a separate weigh-batcher for cement and a satisfactory recorder, such as the 'Printway' for accurately recording batch weights of cement for payment and record. In addition, some type of printed recorder which will indicate cumulative batch weights of aggregates in separate increments will be required. Batch counters will not be required for ready-mixed concrete plants.'

#### **Engineering Director's Report**

Stanton Walker, director of engineering, in his annual report before a joint session, outlined the work that was being done at the laboratories



Al Savini, Stoughton Sand and Gravel Co., Stoughton, Mass.



Adolph C. Bromgard, William Lohof and Henry Lohof, all of Lohof Bros. Co., Billings, Mont

of the two associations at the University of Maryland. He spoke in general terms on such subjects as aggregate specifications, lightweight aggregates and of the new plants to produce artificial lightweight materials. He expressed the belief that specifications for lightweight aggregates should be based on their performance in concrete. The speaker also reviewed concrete specifications and advised his audience to beware of strength specifications that do not clearly define what constitutes the measure of compliance and to be certain that the specification is so written that compliance is practical. He also reviewed results of the annual short course and concrete conferences. Such subjects as research, research fellowships. truck-mixer investigations, evaluation of aggregates and admixtures were briefly reviewed. On the subject of fly ash, the speaker said, "It seems evident that some fly ashes may have properties which are valuable to concrete for certain purposes. It is also evident that fly ashes differ very significantly as to their effectiveness in concrete.

Mr. Walker also spoke of studies on thermal characteristics of concrete, bituminous mixtures, aggregate beneficiation and of investigations for the immediate future. These include reexamination of the effect of temperatures of curing on the quality of concrete, and un-ending studies of durability.

#### **Production and Specifications**

The engineering director's report was followed by an open forum led by Californians on "Production and Specification Problems." The discussion leaders were Robert S. Barneyback, Henry J. Kaiser Co.; George F. Hampton, Pacific Coast Aggregates, Inc.; Bruce Woolpert, Granite Rock Co., Watsonville, Calif.; and Earl Withycombe, assistant state highway engineer for California.

Mr. Barneyback briefly spoke of his company's Radum plant that was to be visited the following day on the field trip. He said the plant had a net capacity of 1000 t.p.h., the net tonnage being 80 percent of the total material delivered to the plant. He called attention to the fabrication plant at Radum where the company makes conveyor idlers and screening surfaces.

Referring to the Eliot plant of Pacific Coast Aggregates, Inc., Chief Engineer George F. Hampton told of the use of rod mills for manufacturing sand from pea gravel. He said the California Rock and Gravel Co. was the first company in the area to manufacture sand using a hammer mill. Later it was replaced with a rod mill. Mr. Hampton said the operating features of a rod mill permitted a wide range of control and that sand from an F.M. of 4.70 to 2.13 could be made economically in a rod mill by controlling rate of feed, rod load and water content. He said a graded concrete sand could be made as well as a minus 16-mesh product. The Eliot rod mill is an 8- x 12-ft. Marcy, center discharge and carries a rod load of 70,000 lb. It is powered with a 350-hp. synchronous motor and produces 55 to 60 t.p.h. with a 75 t.p.h. feed. Much of the loss is minus 200-mesh material, he indicated. In answer to a question about rod consumption, he said that rod consumption was about 1.0 pound per ton and liner consumption 0.25 pounds per ton. In answer to a second question, the speaker said



James A. Hart, Chicago Gravel Co., took the missus along to see California sand and gravel plants

#### SAND AND GRAVEL -



L. P. Struble, Jr., Dravo Corp., Pittsburgh, Penn., left, with K. F. Jones, St. Joseph, Mo.

field cost (exclusive of depreciation) was about 17 cents per ton. Mr. Barneyback said that the rod mill grinding costs at Radum were in the 25 cents per ton range including amortization, and that for one of the smaller rod mills (see January, 1953, issue of ROCK PRODUCTS, pp. 126-129) used for current sand production the costs were in the 20 cents per ton range and that the rod mill made up fine sand deficiencies. Mr. Hampton, in reply to a question, said that the original load in the rod mill was made up of 3; 2; and 1-in. dia. rods and that 3-in. rods were used for make-up rods. All rods, he said, were of high carbon steel.

Irving Warner, Jr., Warner Co., Philadelphia, Penn., told of the use of a 4- x 9-ft. rod mill to build up intermediate sizes of sand. It handles about 30 t.p.h. and about 3 percent of the finished sand is in the minus 100-mesh range. Mr. Hampton also gave some figures to show how rod mills build up intermediate sand sizes.

Mr. Earl Withycombe told of the new book of specifications that the state of California would soon publish and told of the meeting in Sacramento between producers and highway officials where differences of opinion relative to the book's content, were ironed out in a friendly atmosphere. He recommended similar meetings between other state specification writers



D E. Baker and Geo. G. Smith of Houston. Texas at Radum plant

and producers. He spoke briefly about the furor that the new "sand equivalent test" had first caused in California and described it briefly. This is one of the real new developments in sand technology and a description of it appeared in the January, 1953, issue of ROCK PRODUCTS, p. 93.

Bruce Woolpert said that within a radius of 50 miles of San Francisco some 21/2 million cu. yd. of readymixed concrete had been used, and 41/2 million cu. yd. for a similar radius in the Los Angeles area. He said that the only concrete in any amount poured by others than ready-mixed concrete producers was for dams and highways. The speaker told of the use of gravel, crushed gravel, and crushed rock in the San Francisco area. He said that cement supplies in 1952 were satisfactory but that beet sugar producers, at the height of the shipping seasons, competed adversely with the rock products producers for open-top cars. Trucks are used to a high degree to deliver bulk cement. He said that lightweight aggregates were becoming important in the Bay areas. Mr. Woolpert said that the Long Beach earthquake and similar disturbances caused specification writers to insist on continuous inspection of ready-mixed concrete by commercial laboratories. One important phase of Mr. Woolpert's review dealt with the so-called "weight-masters" and "weight masters certificates." He said a movement had been started towards use of a certified weight mas-

ter and weight master certificate, in lieu of conventional inspections. Evidently under the certified weight master procedures, the batcher clerk who makes out the slip can be the certified weight master. As the stipulations are that imperfections in the weighing, batching, certifications, etc., can be a misdemeanor it makes almost an impossible situation unless the batcher also makes out the slips, or, the clerk (who normally makes out the slip) does the batching. The scheme, it was pointed out, puts too much responsibility on the batcher. Mr. Woolpert said that in one case one of his batchers was the weightmaster. E. L. Howard, Pacific Coast Aggregates, Inc., San Francisco. Calif., said that at his company's Fresno plant the clerk was the weightmaster.

The session closed with a brief discussion of ready-mixed concrete for pavements in California. Mr. Barneyback said that the use of ready-mixed concrete for this work was not practical to a large extent mainly due to the 11/2-in. slump requirement, and that dry batching was preferred. It developed that on jobs in excess of 1500 cu. vd., automatic batching facilities must be provided. By this was meant, one push button did the job. Stanton Walker said he was not sold on the overall results of automatic batching. Mr. Gilbert, Corps of Engineers, U.S. Army, said that automatic batchers do go out of adjustment at

## **Heavy Media Separation**

outs P. Struble, Jr., general manager, Keystone Division, Dravo Corp., Pittsburgh, Penn., gave a paper, illustrated with drawings and views, about his company's heavy media separation application on a dredge for the improvement of gravel quality and removal of deleterious substances. One of the reasons for this installation was the requirement in specifications of the Pennsylvania Department of Highways that limit the Los Angeles rattler loss to 35 percent at 500 revolutions and the sodium sulfate loss to 10 percent at five cycles.

Experiments were started as early as 1949 which finally in 1952 ended up with the plant now in operation. Briefly, in this heavy media installation the gravel is fed to an 8- x 8-ft. drum turning from 1 to 3 r.p.m. At this point a media of powdered magnetite is also fed into the system in a proportion of 70 percent magnetite and 30 percent water by weight. Magnetite has a specific gravity of 4.9, but the media has a specific gravity of 2.4 which may be adjusted to varying conditions of the material. The stabilizer or flywheel of the operation is the densifier which holds about

21 tons of magnetite. Raising or lowering the feed screw in the densifier determines the amount of magnetite in the media in the circuit and consequently the specific gravity of the media. Essentially the magnetite in the densifier is "dry," at least it is not fluid. The densifier screw operates continuously and feeds magnetite to a sump where the media is collected. A 6-in. pump delivers the media by pipes to the drum. Turbulence in the sump, piping and drum keeps the magnetite in suspension.

The drum is about one-third full of



Bruce Woolpert, Granite Rock Co., Watsonville, Calif., left, and E. Lee Heidenreich, Jr., consulting engineer, Newburgh, N.Y., at Eliot

#### SAND AND GRAVEL -

media all of the time and the weir height at this discharge opening is about 3 in. Light gravel or the "float" discharges from the drum to the float screen. Heavy gravel or the "sink" gravel falls to the bottom of the drum where it is collected by lifter plates which are attached to the revolving drum. As the drum revolves, the gravel drops from the lifters onto a chute for delivery to the sink screen.

The float screen removes the media from the gravel and then discharges the float material into one of two places; it can go to the waste well which empties into the river or it can discharge into a chute which delivers the float material to a bucket elevator which, in turn, elevates it to a conveyor belt that takes the float material back to the crusher on the dredge. Although this set-up is not now being used, it is planned to experiment with this float material to see whether it can be crushed to sand to increase the percentage of fines. Sink material goes to a 6- x 16-ft. three-deck screen where the media is washed from the gravel and the gravel is graded to meet final specifications. More complete details and illustrations covering this operation are to be found in an illustrated article appearing in this issue by W. L. Price, engineering manager of the company.

Mr. Struble said that although the plant will do the job effectively, a number of problems remain to be worked out. One of the more important problems is that of obtaining a closer classification of material in the drum. Separation of the larger particles of gravel is pretty well defined, but the smaller particles do not sink as readily with the result that a fair amount of good material passes out with the float product. However, it is now possible to produce gravel with a rattler loss as low as 29 percent, and sodium sulfate losses have been decreased from upwards of 8 percent to around 4 percent. There are economical limits to the specific gravities at which the plant can be operated. It is one thing to operate with a float loss of 20 percent and another thing to have a float loss of upwards of 50



H. J. Bellamy, Concrete Materials Co., Waterloo, Iowa, left, with E. A. Goodman, Jr., Salisbury, N.C.

percent. It is not necessary to produce material with extremely low rattler losses and sulfate losses. The bad actors in gravel deposits are removed at relatively low specific gravities and further refinement insofar as these tests are concerned is not necessary.

#### **Heavy Media Results**

Following the paper on application of the heavy media process to gravel production, a paper prepared by Stanton Walker, director of engineering and D. L. Bloem, assistant director of engineering of N.S.G.A., entitled "Laboratory Tests of Aggregates Treated by the Heavy Media Process" was read by Mr. Bloem.

The paper was a compilation of data resulting from a series of tests on both the "sink," and the "float" fractions of gravel from several sources. Some of the gravels were treated at the Stamford, Conn., laboratory of the American Cyanimide Co. The speaker showed slides giving tabulated data on the physical prop-



H. C. Gray, Acme Materials Co., Tulsa, Okla., left, and W. A. Hazelett, Union Rock & Materials Co., Phoenix, Ariz.

erties of the coarse aggregates, results of freezing and thawing tests, both for normal concrete and air-entrained concrete. Tests were also made on blends of sand made from natural sand plus that from crushed portions of the "float" fractions. These data were also shown with slides. The conclusions from the series of tests were as follows:

"Heavy media were very efficient in removing lightweight constituents as evidenced by progressive increases in specific gravity of sink materials as specific gravity of the medium was increased.



J. S. Cooper, Memphis Stone & Gravel Co., Memphis, Tenn.

"The materials removed as a float fraction were of inferior quality as indicated by their high absorptions and the presence of much larger quantities of deleterious particles (such as chert, limonitic sandstone and soft pieces) than were found in the parent materials.

"The quantity of deleterious particles in the sink materials was lower than in the parent material. However, heavy-media separation was not successful in removing all of the deleterious materials from the aggregates.

"The sulfate soundness loss of one of the aggregates tested was materially reduced by treatment in heavymedia.

"Freezing and thawing resistance of concrete was appreciably, and in some cases greatly, improved by treatment of the coarse aggregate in heavy media of the higher specific gravities. In general, the improvement became progressively less as the density of separating medium was decreased.

"For the single case studied, the use of crushed float material from heavy media treatment to supplement the fines in concrete sand was not detrimental to freezing and thawing resistance of the concrete."

Tabular material and graphs to show results were too voluminous to publish but, shown herewith, are tabular material and a graph for tests run on one of a series of graphs treated in the heavy media pilot plant. They serve to illustrate the kinds of results obtained from tests.

Characteristics of Coarse Aggregates treated in heavy media pilot plant

		Speci	fie Gravity of	Heavy Media	
Item	2.47	2.44	2.40	2.35	Untreated
	hysical Prop	erties of Coars	se Aggregates		
		110	Sink Material"		
Specific gravity (bulk dry) Absorption, percent:	2.68	2.66	2.66	2.65	2.61
Immersed 24 hours Vacuum saturated Soft particles, percent Chert, percent	1.8 1.8 (1)	1.3 1.0 13 6	1.4 1.8 12	1.5 2.0 15 8	1.9 2.6 17 8
eners percent			Float" Materia		
Percent of total Specific gravity (bulk dry) Absorption, percent:	2.24	12,26	10 2.16	× 2.10	0
Immersed 24 hours Vacuum saturated	6,6 8,6	6.8 9.4	7.5 9.6	8.4	
Soft particles, percent Chert, percent	43 29	4.4 27	51 23	57	

## **Merchandising Sand and Gravel**

NE OF THE MOST INFORMATIVE TALKS in the joint merchandising session was a paper "Merchandising Sand and Gravel" by Charles E. Brady, Lessees of B. V. Hedrick Gravel and Sand Co., Lilesville, N.C. It is not often that anything is said about merchandising sand and gravel, the tendency being to assume that the sand and gravel producer is mainly concerned with production to meet contracts on which it is the successful bidder. The problems involved are far different than for ready-mixed concrete and much depends upon the promotion of new uses as such, as brought out in Mr. Brady's paper.

The Material Sales Co., Salesbury, N.C., was organized some 15 years ago by two sand and gravel producers, expressly to promote the uses and sales of gravel and sand. Its policy from the beginning was to stress service and dependability.

The sales company now represents two plants at the same location on the Seaboard Air Line Railway far removed from any sizeable city, a plant on the Southern Railway close to a large city which trucks most of its production and a fourth plant which was installed to supply materials for construction of a large military base. Thus three types of plants are represented which produce a wide range of materials ranging from quartzite sand and gravel, 99.8 percent S1O2, to a chemically heterogeneous boulder product and from 34-in. top size to 6-in. top size to 6-ft. bould-

Thus, it becomes necessary to discuss materials intelligently with railroad engineers, ready-mixed concrete producers, army engineers and many other classes of buyers which makes it highly desirable that the sales representatives become thoroughly familiar with all characteristics of the materials and the abilities of the several plants to produce the various sizes.



Jack Owens, Eastern Rock Products, Inc., Utica, N.Y.

It is preferred that salesmen have engineering backgrounds and be given training in the N.S.G.A. laboratory and other laboratories.

The company makes it a practice to survey the potential market, and re-appraises its customers in detail every year. Salesmen concentrate on selling the slower moving materials but policy is to never sell a product where it is unsuited. Caliber of the salesmen is considered of utmost importance since they make the impressions that will endure.

Seven years ago the firm initiated a stag house party, at a time when it had certain problems to work out with regard to state highway specifications. The party was so successful in creating an atmosphere to work out such problems that it has become



Howard W. Jardan, Metropolitan Sand and Gravel Corp., Port Washington, N.Y.

an annual event and these parties now have as guests outstanding experts in their fields.

A long-range planning program is in effect under the guidance of a planning group which has resulted in opening up new large markets and finding markets for hitherto waste products. Sand sales from the Lilesville plants was a problem so the concentration has been on ready-mixed concrete plants and concrete products plants to build steady volume. Materials for asphaltic mixes were given concentrated study, with a trend away from concrete pavement in the area, with very successful results. A nice market has been developed for the quartzite gravel in the production of silicon and ferro-sili-

Among other activities are work with specification writing bodies in the interests of adoption of realistic specifications, appearances before freight rate-making bodies and advertising.

#### **Multi-Line Sales**

An extremely progressive business and sales policy was described by Robert F. Porter, vice-president, Harry T. Campbell Sons' Corp., Towson,



H J. Bellamy, left, and F. E. Bellamy, Concrete Materials Co., Waterloo, Iowa

Md., in a paper entitled "Sales Policies for Multi-line Companies." Mr. Porter's presentation had a lot of punch and enthusiasm in telling how his own company has built its volume of business from about \$100,000 a year in 1922 to a volume of \$10 million today. The company is still growing and continues to be alert to new possibilities for expansion of markets.

At the beginning, a single stone quarry was in operation and a few products were marketed. Today, 105 different items are being sold. The primary principle in development has been to "explore the field thoroughly, then progress slowly."

In the early years, concentration was on the building of roads and bridges but the company found that it was competing against its best customers and organized into a production sales organziation. While Mr. Porter was educated as an engineer, he insists that the sales organization is the most important part of his company's business without any qualifications.

Some of the 105 items sold were listed as follows:

- Face stone and flagstone produced at three quarries; foundation stone and rip rap.
- 2. Crushed stone in all sizes.
- Gravel plant products including all sizes of washed gravel and sand, bank sand, top soil and stabilization materials.
- Transit-mixed concrete produced at two plants.
- Sakrete products at three plants with a fourth under construction.
- Camelite—a bituminous mix concrete or hot mix black top produced at three plants.
- A ground calcium and dolomitic limestone for agriculture.
- A magnesium sand for fertilizer filler.
- A great variety of products from the company's calcite plant including poultry grit, ground barn calcite, limestone flour, finely ground calcite for the manufacture of paint, rubber,

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ceramics, plastics and coated papers, surfacing material for airport runways, asphalt filler, roofing material, calcite for stucco finish and a product to prevent skidding on slippery pavements.

In addition, the company also sells many services to the public such as building of private driveways, industrial roads and parking lots; construction and repair of railroad trackage, sidings and yards; all types of grading, excavation and structural concrete in connection with new homes and buildings, as well as the rehabilitation of old homes and industrial buildings.

Years ago, the company adopted a practice of studying the market possibilities for by-products and, as a result, a number of the most marketable items have been produced from materials that otherwise would have been wasted. Examples are the product to prevent skidding, asphalt filler, and ground barn calcite.

Certain principles have been established within the organization which Mr. Porter itemized as essential to merchandising. First, the product must be as nearly perfect as possible. His second point was that materials should be delivered in clean, modern equipment. His transit-mixed concrete is delivered in brilliant red mixers with the Campbell trademark and lettering in black. Trucks and mixers are washed daily and are sent to the shop for overhauling and painting periodically during the slack season. A safety slogan "watch that child," painted on every mixer truck as a constant reminder of the need for safe driving, has made quite an impression on the public.

A third point of general policy mentioned, was to give prompt deliveries that coincide as nearly as possible with the customer's schedule. Fourth, material sold in packages is made as striking and attractive as possible. Mr. Porter's fifth point is to impress personnel in the order department with the importance of good telephone manners. In his company, even the plant superintendents are trained as salesmen, just as salesmen



Ellis Jensen, Janesville Sand and Gravel Co., Janesville, Wis., left and Wm. Goldie, The Goff-Kirby Co., Cleveland, Ohio

are trained in production, so that complaints may be handled efficiently and courteously.

Great care is exercised in the selection of salesmen and preference is for technically educated but at least technically-minded men. All the successful salesmen have had at least three years in production. They promote sales and are trained to be helpful to customers in many ways other than the routine of getting an order. Experience has proved that it takes at least two years to educate a salesman in the concrete field and Campbell salesmen are active in promoting lightweight concrete, prestressed concrete and concrete for out-of-the-ordinary jobs. Salesmen in the calcite department are chemical engineers.

In the Sakrete department, taken on originally as another outlet for sand and gravel, there is a department head and a sales manager. After training, the salesmen take over territories and live in them and each considers his territory as though it were his own individual company. Campbell believes in paying its sales personnel well, as the most powerful incentive to greater sales. Great importance is attached to having salesmen who sell themselves, which is the secret of a successful salesman, and Campbell's salesmen are the type who visit sick customers, send flowers and gifts where occasion demands and render many of the little courtesies which mean so much in business.

Every person in the company, after three years service, is eligible to receive 6 percent preferred stock at no cost to him, and about 80 percent of the employes own stock. The company has never missed a year paying dividends. A group insurance and hospitalization plan is in effect protecting employes against costly illnesses or off-the-job accidents and their wives and children as well. Hospitalization due to accidents on the job are, of course, covered by employment compensation. Also, service emblem awards are given and annual dinners are held for men with 25 years of service. Thirty-seven men have a minimum of 25 years of service.

All salesmen, sales managers and department heads are given company-owned cars ranging from Fords to Buicks, for their personal use on the theory that a Sunday drive might even be instrumental to tips for follow-up as new construction is observed to be starting somewhere. Two expediters in sales of concrete and aggregates have company-owned cars with mobile telephones.

Promotions throughout the organization are encouraged and sales meetings for all sales personnel are held every six weeks. A representative of the company's advertising company is present at each of these meetings, the company being a strong believer in the value of advertising. The book "Keep Selling for Keeps" by Robert



Ivor Thomas, Henry J. Kaiser Co., left, and Eugene R. Booker, secretary, Rock, Sand and Gravel Producers Association of Northern California



F. L. Kelley, Colonial Sand & Stone Co., Inc., New York, N.Y., with hands in pockets



H. Norman Johnson, Jr., and H. Norman Johnson, Sr., of Fourth Street Rock Crusher, San Bernardino, Calif.



G. R. Bathe, left, and A. P. Jones of Lyman Richey Sand & Gravel Corp., Omaha, Nebr.



Irving Warner, Jr., left, and Irving Warner, Sr., right, of Warner Co., Philadelphia, Penn., receive Class A safety trophy from president A. R. Shiely of N.S.G.A.



Winner in the N.S.G.A. Class B competition was the Hearne, Texas, plant of Gifford-Hill and Co., Inc., Dallas, Texas. President A. R. Shiely of N.S.G.A. (center) awarded the trophies. To the extreme left is J. Rutledge Hill, president of winning company. Next is H. M. Lacy, Dallas Concrete Co., Dallas, Texas, affiliated company. To Mr. Shiely's left are: J. A. Whyte, H. H. Wilson and F. R. Gifford, all of Gifford-Hill



President A. R. Shiely of N.S.G.A. (left) awards Class C safety trophy to L. C. Curris, center, and A. P. Jones, both of Lyman-Richey Sand and Gravel Corp., Omaha, Neb.

Palmer Corp., Santa Barbara, Calif., is used as the basis for discussion in these meetings. Mr. Porter closed by emphasizing that salesmanship is a profession and that good salesmen should be paid well.

#### Safety

Following the election of officers in the concluding session of N.S.G.A., president A. R. Shiely awarded the Rock Products safety trophies to the three winners of the 1951 safety competition, and the recipients of the trophies briefly discussed their safety policies.

Irving Warner, Jr., Philadelphia. Penn., received the trophy awarded to the Van Sciver plant of the Warner Co., winner of the competition for plants working in excess of 100,000 man-hours. Mr. Warner read from a prepared paper, the highlights of the company's safety policies. To begin with, it was pointed out that a safety program must reach everyone in an organization to be effective, otherwise safety might be upset by any one individual's lack of cooperation. A successful safety program must be backed by action, it not being enough for top management to say they want a good safety program and then be unwilling to spend the time and money to prove it means business. On the other hand, a company may have a fine program which can fail because the foreman fails in his part.

The Warner Co. has tried many ideas over the years but its main endeavor has been to build up a safety consciousness in each employe, in which reports, billboards and safety meetings play a part. Responsibility for safety is placed with line supervision and the company has a safety engineer who acts in a staff capacity to all plants and who assists the line organization in the overall program.

An important point made was that all accidents must be prevented in order to prevent serious accidents. The various accident forms in use, and their purposes, were described. The company insists that a complete study be made as to the cause of each accident. Accidents are reviewed and analyzed by the safety engineer and recommended preventative steps noted. A part of the foreman's bonus is based on his participation and attitude in the overall safety program.

Safety inspections are conducted by local committees at each location, their recommendations are submitted up the line and a record kept as to disposition. When large expenditures are involved, the superintendent is responsible for getting approval of the vice-president in charge.

The Van Sciver safety committee consists of foremen and hourly men and holds monthly meetings in which progress on the recommendations of previous meetings is reviewed and new safety ideas are presented. Minutes are kept on record. A bi-monthly

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safety suggestion contest is conducted and cash awards made. The best suggestions from each location are judged by a central suggestion committee and the winner receives a second cash award. Local winners have their pictures and suggestions posted on the local bulletin boards and the company-wide winner has his picture in the company publication.

Annually, the company has printed safety pledges which are signed by all employees and an award is made to the employee submitting the selected winning slogan. This year, the company is striving to have each foreman hold monthly safety meetings with his own work crew. Safety posters are used on all bulletin boards and foremen attend some of the Safety Engineers' Club meetings to learn what other organizations are doing. Two Presidents' safety trophies are awarded annually to the large and small plant having the best safety record in the previous year. In conclusion it was pointed out that safety and production are really one and the same and that the goal is safe production.

In accepting the trophy for the Hudson plant of Gifford-Hill and Co., Inc., Dallas, Texas, president J. Rutledge Hill said that "we just plain work at it." This plant was the winner in the class B competition, in the 50,001—100,000 man-hours classification.

L. C. Curtis, vice-president, and A. P. Jones, general superintendent, were on hand to receive the trophy for its plant 7A, winner in the class C competition for plants working 50,000 man-hours or less.

In accepting the trophy, Mr. Curtis made some very specific comments on the practical value of safety which should convince any producer that he can profit by developing safe operations. Mr. Curtis first expressed his appreciation for the award and then outlined the scope of his company's operations. At present the company has 12 production plants all in Nebraska. Ten are rail and two are truck plants, all excavating with dredge pumps, and supervision consists of one general superintendent with a foreman at each plant. Operating personnel numbers from 4 to 12 at each plant.

In the spring of 1933, before a safety program was organized, the company's compensation insurance carrier cancelled the policy because of unfavorable accident experience. Then, the company set up to carry its own insurance and an organized safety program was established. A physical examination was required of each employe, membership was taken out in the National Safety Council and H. A. Koop was appointed safety director. He has been in charge ever since.

Then followed a program of preliminary inspections, the posting of bulletin boards, safety meetings were scheduled and an inter-plant safety contest was started. Cash awards are made to the foremen according to the records, which by custom are shared with the employes.

Immediately following start of the safety program, there was a big drop in the lost-time accident record. Subsequently, a perfect record was nearly achieved several times. In 1943 the company's compensation insurance business was again solicited by the former carrier and a policy furnished on a retrospective payment plan basis. Sizeable refunds have been made each year under the plan.

Many savings in operations are directly traceable to the safety program, reflecting in ability to extend free life insurance, a hospitalization insurance plan, increases in pay and a paid vacation plan. Better inter-company relations have been experienced as well as greater overall efficiency. The cost of establishing and maintaining the safety program has proved negligible.

#### Percentage Depletion

By way of introduction to a talk on percentage depletion for the sand and gravel industry by John T. Sapienza, member of Covington and Burling, association counsel, Washington, D.C., J. Rutledge Hill, presiding officer, who is chairman of the percentage depletion committee, stressed that percentage depletion is the very key to staying in business. No producer has an inexhaustible supply of raw materials, he said. An important point brought out by Mr. Hill was the influence of specifications and changes incorporated into them which place more rigid requirements on acceptable materials. In this regard, he referred to the earlier talk in another session by J. R. Gilbert, U.S. Corps of Engineers, on the subject of specifications for aggregates which emphasized his point.

Mr. Sapienza covered the subject of percentage depletion in its entirety to bring it up-to-date. At the outset he urged the sand and gravel industry



L. C. Jones, left, and Gaylord W. Jones, represented John Jones and Sons, Inc., a company in business since 1870 in Indianapolis, Ind.



C. A. Munz, Eastern Rock Products, Inc., Utica, N.Y., was caught scurrying around one of the plants

to retain and foster its interest in percentage depletion, stressing that the industry is entitled to its benefits which give inducement to seek out and discover deposits to replace those depleted.

He traced the enlargement of percentage depletion applications from the beginning when, in 1926, the oil and gas industries were first given benefits. Coal, sulphur and metals were included in 1932 and, in 1941, 1942 and 1947, various types of operations were added to swell the list of eligible products. Sand and gravel along with other non-metallic industries were added to the list in the Revenue Act of 1951. Mr. Sapienza said that much credit was due to executive secretary V. P. Ahearn and Mr. Hill for their efforts toward having the sand and gravel industry included.

Percentage depletion is not a gift or subsidy, he said, but a means for recovery of capital as a necessary inducement to make it possible to finance the finding of new deposits and their operation. At present, 5 percent of the gross income from mining a property, but not to exceed 50 percent of net income, is deductible in computing income taxes. A producer has the option to take either percentage depletion or cost depletion, whichever is the higher.

whichever is the higher. Mr. Sapienza touched upon some of the many complications involved in the regulation, certain of which are as vet unanswered. The rules apply to gross income from the extraction and ordinary treatment processes to produce a marketable product and permit transportation costs, not to exceed 50 miles, before processing into marketable products. Questions in need of clarification, for example, are definitions of normal treatment processes and what constitutes a commercially marketable product. Properties are to be treated separately but Mr. Sapienza said that two deposits on a single tract may be considered as one which may prove important under cer-

tain circumstances.

As far as eligibility for percentage



J. T. Mogan, left, and G. G. Rabinson of Consolidated Sand and Gravel, Ltd., Toronto, Ont., Canada, had a chance to compare outstanding California plants with their new, modern plant in Canada

depletion is concerned, companies which own the property or those which lease to others, if on a royalty basis, are entitled to it, as are those who lease a property and have exclusive rights unless the lessee is entitled to it. Oral lease arrangements may raise questions as to eligibility and it was urged that all producers in that category get their lease arrangements in writing.

In cases where there is an operating loss incurred, cost depletion should be taken. If percentage depletion exceeds cost depletion, that amount of difference is lost and it becomes necessary to reduce the loss by the difference between the percentage depletion and cost depletion. If a loss still exists, it is deductible. Operating losses may be carried back several years, the assumption being back to the prior year when the company had percentage depletion. Usually, no percentage depletion applies when there is operating loss on a property.

The exact views of the Internal Revenue Department will not be known until final regulations are issued which is expected in April or May of this year. The situation as it existed at the time of Mr. Sapienza's talk was as follows: Section 319 of the Revenue Act of 1951 granted 5 percent depletion to the sand and gravel industry. Public Law 594 entitled fiscal year companies to percentage depletion beginning January 1, 1951. The Revenue Act of 1950 as amended added the right to include transportation costs up to 50 miles to the ordinary treatment processing plant. Section 309 of the Revenue Act of 1951 provided for development expenditures by permitting deductions for tax purposes on a going basis according to the rate of production from the deposit. Until this ruling, an operator had to capitalize all development expenditures after a deposit was disclosed and later recover by cost depletion. The change permitted recovery of these expenses directly from gross income. Section 342 of the Revenue Act of 1951 permits exploration expenditures to be deducted

immediately but not to exceed \$75,000 per year and to apply for only four taxable years.

Hearings preliminary to issuing the final regulations were concluded on December 23, 1952, and in view of the changed administration and appointment of a new commission of Internal Revenue it is difficult to forecast what to anticipate, said Mr. Sapienza. However, he said that the majority of the members on the House Ways and Means committee are in favor of percentage depletion, and he anticipates that percentage depletion benefits wil! be continued barring allout war.

He touched upon attempts that will be made to throw it out, and the great need to continue the fight for percentage depletion. As an example, on February 3, Representative Bennett of Florida introduced a bill that would repeal percentage depletion for sand and gravel and the other industries added in the Revenue Act of 1951. This bill has been referred to the Ways and Means committee where Mr. Sapienza believes it will be killed.

A campaign to sell the justification for percentage depletion must be continued and enlarged to educate congress and other industries to the fact that suitable sand and gravel deposits are not readily available over the country, he said, and he believes such a campaign of education not only would be the means to preserve the benefits of percentage depletion but can later be the means to increase the benefits. There are those in the revenue department who think that all industries with expendable resources should have the same percentage depletion which might be 71/2 or 10 percent.

In figuring 1952 tax returns, he suggested that the industry should have followed the advice of Mr. Ahearn and that each company discuss the problem with its counsel and consider court decisions handed down in arriving at its individual decision in making the return.

In conclusion he said that the final



E. M. Heuston, South Milwaukee, Wis., new chairman of the Manufacturers' Division

regulations to be issued may be subject to change later by action of congress or by revisions to the law.

A number of questions followed. The answer was "yes" to a producer who asked if the 5 percent deduction can continue to be applied after the cost of a property has been realized. An eastern producer mentioned that 50,000 cu. yd. of his material was removed for a housing project and asked whether or not he was entitled to percentage depletion. The opinion was that he was.

#### Zoning

The growing seriousness of zoning restrictions was the subject of a short talk by Howard W. Jordan, president, Metropolitan Sand and Gravel Corp., Port Washington, N.Y. Mr. Jordan gave a case history of the experiences of the Steers Sand and Gravel Co., which also operates on Long Island 45 miles east of New York City. Plant operations here adjoin several hundred square miles of glacial gravel land on the north side of Long Island of which not more than two or three sq. miles might be permissible for plant operations today.

The Steers firm has been excavating sand and gravel in the area for many years and had intended to enlarge operations over into leased adjoining property, which proved to be covered under a zoning law that had been enacted in recent years. The company applied to the zoning board for permission to operate that property. Many long evening hearings were held at heavy expense without any positive action, when Steers proposed a referendum to present the case to the community. The company worked out a set of conditions under which it agreed it would operate, including the establishment of a minimum mining level, a plan for rehabilitation of worked out areas with complete landscaping, setting of a time limit for each property, and termination after 12 yr. and the placing of 6 in. of topsoil over worked out, rehabilitated property, etc. It was also required to post a \$500,000 performance bond covering these conditions. Then the vote was made in favor of the company but the court injunction still stands on the record.

Mr. Jordan said that his company had a 1-yr. permit expiring in April and that it was a nerve-wracking situation because in cases of zoning a company is either permitted to continue operations or refused completely. There is a great need for better public relations and he cautioned producers to give this problem proper recognition. His company is considering engaging a public relations firm to prepare news articles and is preparing a 4-dimensional contour man to show to the town officials exactly what is planned in the way of rehabilitation.

A. R. Shiely, J. L. Shiely Co., St.

#### - SAND AND GRAVEL -

Paul, Minn., held up a case involving his own company to show "how to get the kind of zoning you want and be very unpopular." The company had a quarry in St. Paul where there had been no zoning restrictions. When zoning restrictions became imminent, a deposit was purchased across the river in a township which had no zoning laws. After some ten years of operation, adjoining property was purchased and it was found later that zoning restrictions had been passed which affected this property. The company did not know of meetings which had been held but found itself with property it could not use. The company agreed to do certain things including a program of rehabilitation and was successful in having signed petitions of approval from the majority of people in the immediate area. The zoning board then agreed to permit operations but, in an open hearing, the public was strongly opposed to the move. A small village set up in the area with control over zoning was the final means of getting clearance to operate.

#### Stream Pollution

Another problem that the sand and gravel industry must face is a nation-wide trend to enforcement of rules covering stream pollution, according to a talk by E. K. Davison, J. K. Davison & Bro., Pittsburgh, Penn. As examples, he said that five states already prohibit any stream pollution and the state of Texas prohibits any practices that result in water changes. He cited the various laws on the books and mentioned some of the agencies which have the power to issue regulations.

As far as the sand and gravel industry is concerned, the problem will become serious particularly to operators of dredges on navigable streams, if they take an unrealistic view. Water-borne silt and fine sand in discharging have the effect of causing turbid conditions and tend to cover over aquatic life, which is the important thing to watch. The relation of volume of silt and fine sand to the total volume of the discharging



Edson Hardy, Jr., Dixie Sand and Gravel Co., Chattanooga, Tenn., watching a big dragline in operation at the Eliot plant

stream is of importance but it is difficult to alleviate turbidity when wasting certain sizes and discharging silt and slimes back into the stream. No dredge, he said, is big enough to provide adequate settling areas for the purpose. In his opinion the dredge operator's only course is to request legal exemption and show proof that his operations have no adverse effect on the water.

In favor of dredge operators is that dredge operations aid in keeping streams navigable. In conclusion he said that the industry should become acquainted with the laws and recognize that regulations governing stream pollution are a growing problem. Once a law is written, it will be a tough problem to combat.

#### Cost Accounting

"Cost Determination for the Sand and Gravel and Ready Mixed Concrete Industries" was the subject of a paper by John W. Murphy, Union Sand and Gravel Co., Spokane, Wash. The purpose of this paper, which was devoted mostly to ready-mixed concrete but covered sand and gravel as well, was not to suggest how to set up a company cost accounting system but rather to convince producers of the need for cost accounting systems by pointing out benefits. He suggested some of the factors to be considered in arriving at a system that would be of value for the guidance of the smaller producer in particular.

Mr. Murphy believes that profit and loss statements should be prepared monthly, to be supplemented by special reports such as, in the case of his company, a weekly statement showing the cost per cubic yard of wages for mixer truck operation.

Among the reasons enumerated for keeping adequate cost records were to show whether or not a company is making money and how much, to show where cost dollars are going so that operations may be pin-pointed to reduce excess costs, for use in dealing with banks and for tax purposes. Cost records can be of invaluable use. he suggested, in checking the activities of a sales department so that sales effort may be concentrated for best advantage. A thorough understanding of a company's costs of operation is a means to take advantage of opportunities to sell its product where profit will be greatest.

Cost comparisons for successive periods may be made available to the executive of a company so that steps may be taken to correct excess operating costs. Mr. Murphy gave emphasis to this point by calling attention to the fact that unrecognized excesses in cost of even a few cents per cu. yd. accumulate to a sizable sum with high volume business.

Another important benefit is to better prepare companies in both industries for the time when competition will become keen and lowered



R. L. McMillian and Russell Thorstenberg, Thorstenberg and Tamborello, Houston, Texas

selling prices prevail. Also, accurate cost records may be of great assistance in making decisions as to when to buy equipment and in the selection of types of equipment. Cost systems need not be expensive, and he pointed out that normal bookkeeping practices may easily be converted into a cost accounting system by the same personnel.

Mr. Murphy recommended that the manuals on cost accounting put out by the two associations be closely studied as a basic guide to adopting a system. He then outlined a simple basic program for a ready-mixed concrete company which sells concrete only. He believes that sales of ready-mixed concrete for such a company should be kept in one account for each plant. Any miscellaneous sales such as sacked cement, etc., could be kept in a second sales account or could be broken down as the individual operator wished.

He suggested that in its simplest form the costs of such an operation should be kept in three parts. First would be the direct costs of running the plant. The second cost breakdown would include all delivery costs which he believes the most important. Each operator, according to his recommendation, should keep delivery costs in such a way that he can come up monthly with a cost per hour for running his truck fleet, a cost per cu. yd. for delivering concrete and a cost for each truck per cu. yd. and per hour. The third breakdown would include all overhead items. Mr. Murphy then explained how his company handles delivery tickets to facilitate cost accounting.

Plant costs would include materials, operating and repair labor, repair parts, power, water, fuel and depreciation on the plant. In keeping plant costs, it was suggested that each producer keep a record or perpetual inventory system on cement. A failure of scales can result in substantial loss of cement. Mr. Murphy's company calculates from the delivery tickets each day the amount of bulk cement which should have gone into the concrete that day. The operator of the plant

(Continued on page 148)

# AGSTONE INDUSTRY Has Big Selling Job Ahead

Spreading agstone on a Wisconsin form

EVER SINCE THE REPUBLICAN VICTORY in the November, 1952, national election, there has been concern among many agricultural limestone producers, lest federal appropriations for soil conservation be sharply reduced or even eliminated. This concern apparently was well-founded judging from the government's avowed goals of economy, and the recently expressed position of Secretary of Agriculture Ezra T. Benson on the subject of soil conservation payments.

In an exclusive interview published in the March 6, 1953, issue of U.S. News and World Report, Secretary Benson, in response to a question as to farmers seeking the help of the government in the solution of their

problems, said;

"I think that has been encouraged and it has grown across these years. Many farmers have been taking government help against their own better judgment, contrary to their own conscience. When I made the loop around the country just before I was installed-and I did this deliberately on my own, with just the desire to get acquainted and get the feel of the industry: I hadn't been as close to it in recent years as I had been formerly-wherever I went and talked with small groups of farmers-there were usually three or four, sometimes only one farmer-often they'd say, 'Well, we've been taking these government handouts, but we've never felt quite right about it ....

In this statement he was referring particularly to payments for annual practices such as the application of fertilizer and liming materials which were considered as practices which farmers "would normally do anyway." As to the cost of the program, he said that about 40 percent of \$250 million assigned to the U.S.D.A. for those payments were for application of fertilizer and liming materials. The balance went to so-called more permanent improvements such as terracing, building reservoirs and other developments.

In answer to whether this is a type of program that could be done away with, the secretary said, "I think it's one we have to look at very carefully and critically."

Because the American Farm Bureau and the National Grange support this view, it was clear, as this was written, that it would be extremely difficult to maintain the A.C.P. appropriation at the current \$250 million annual level for the 1954 program. Apparently, the mobilization of grass root farmer support by effected industries, exerted through their congressmen, was the best hope (again, as this was written) to forestall a drastic cut in the program and an effort was being made in that direction. Surveys had indicated that a large majority of farmers wanted the program to be extended without any reduction. It was rumored in early March that an appropriation of \$160 million or even less would be requested for the 1954 program.

Such a reduction in funds would set up quite a challenge to many producers of agricultural liming materials, particularly many of the smaller ones who have depended upon government funds, and on the efforts of P.M.A. and state agronomists to move their product. These producers have made little or no effort to sell their product on its merits and such producers are the more vulnerable. On the other hand, many of the larger and/or more resourceful producers have built their business through effective sales promotion and educational work among farmers with the result that they are not particularly concerned whether government appropriations be reduced or even elimin-

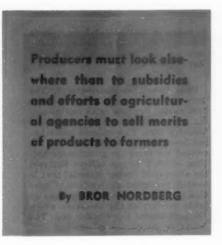
A third group includes producers who have made an honest effort to promote wider use of agricultural limestone but with relatively disappointing results and they, too, are concerned for the future of their individual businesses.

The N.A.L.I. has been following two courses in its efforts to enlarge the use of agricultural limestone. It has been very actively pushing for an adequate federal soil conservation program and has greatly accelerated its sales promotion activities which have resulted in a vast amount of literature being made available to the press and to individual members for their

The disturbing thing is that progress has been painfully slow, and it is a "mystery" to many producers and agronomists that the farmer has failed to use more agricultural limestone. Its many merits have been proved beyond question and there is a wealth of scientific data which substantiate that the cost of agricultural limestone to the farmer is paid back many times over in increased yield

Latest authentic figures reveal that 495 million tons of agricultural limestone are required now to bring the nation's soils up to the proper mineral level and that 50 million tons must then be applied annually to maintain this level. Peak application thus far has been at the rate of about 30 million tons annually but there has been little progress in the past five years.

This fact is not only the concern of the agricultural limestone indus-



try; it is a serious matter that is vital to all of us and the fact, that reduction in soil conservation appropriations might reduce the volume spread well below the existing rate, needs careful study. We are faced with continually increasing demands for higher production from shrinking acreage in the face of unprecedented population growth, from soils already depleted as a result of record-breaking demands for farm products in the postwar years. And, it is proved that liming is the number one basic factor to higher farm production.

As to the federal soil conservation program, the figures prove that it has greatly stimulated the use of agricultural limestone (see accompanying graph) and it has been the means of getting many farmers to start using it, but, apparently, resistance to further use has come with the gradual trend to requiring farmers to pay a greater share out-of-pocket for its cost. This movement by the government to require the farmer to pay a greater share for this soil conservation practice, and the great drop-off in sales of agricultural limestone when appropriations were suspended temporarily in 1948, are indicators of what likely will happen should appropriations be drastically reduced. The problem will be all the more serious in the face of declining farm prices, which many consider as even more serious to the cause of agricultural limestone than a reduction in federal funds.

It is not our purpose herein to take a position as to whether or not federal soil conservation payments are desirable or not; rather, we give emphasis to the need for much greater use of agricultural limestone in the national interest by whatever means, and seek to promote the best interests of the agricultural limestone industry.

Regardless of the expressed opinion by the Secretary of Agriculture that "hand-outs" are not desired, the fact does remain that the farmer continues to liquidate productive capital assets under existing economic and tax laws which consider him as in a profitmaking business. He should charge for replacing fertility of the soil or he finds himself in the position of giving away his farm for the privilege of having been a farmer.

There are those who maintain that the farmer should include costs for maintaining fertility in his prices and that there then would be no need to pay him back in the form of "subsidies" for soil conservation activities. They reason further that in the absence of such a condition that the farmer is entitled to the benefits of soil depletion for income tax purposes.

Rock Products has stressed the necessity for sales promotion in its April Agricultural Limestone Issue each year for the past several years in an endeavor to encourage selling agstone on its merits, rather than to depend upon government funds.

We have taken a slightly different approach in this issue because of the apparent fact that sales promotion has not been doing an effective job in getting farmers to buy more liming material. We have asked producers to suggest approaches to the problem of inducing farmers to buy agricultural limestone out-of-pocket. We have also asked them to tell their own most effective methods of promoting sales, to comment on the chief obstacles to selling agstone and suggest methods to overcome these difficulties, and to give their opinions on the probable effect on their own businesses and on the industry as a whole should soil conservation appropriations be reduced or eliminated. We also asked agronomists to give the industry the benefits of their ideas on how to increase sales.

Response to our letters was generous and we thank all those who contributed to our discussion. We summarize the letters herein, quote from some of the more informative and follow with special signed articles by leading agronomists and one by Willis Stout, Soils Editor, the Kentucky Farmer, written from the point of view of a farmer.

#### Sales Approach

Producers suggested many approaches to increasing sales of agstone. First and foremost was that efforts must be concentrated on procing to the farmer that he profits in higher yields. It's a case of putting across the technical information now available, by every means of promotion in a program that must be educational in character. Media to be used are demonstrations, movies, group meetings, speeches and all forms of advertising and direct mail, in getting the benefits of liming across to the farmer. The dollars and cents profit angle must be so emphasized, backed with proof, say the majority.

The industry must conduct its business like any other progressive industry, and establish its prices to include the cost of a sales program that will put the story of agricultural limestone across, as contrasted to dependence upon government bidding which has not produced sufficient volume. There are many who have found out that personal contact by qualified representatives is bringing results and they strongly urge that all in the industry employ such sales representatives.

Some, of course, have employed agronomists with excellent results. These men perform a substantial service in helping the farmer to adopt good practices over and above the use of agricultural limestone itself. A producer in Maryland who does not fear the consequences if soil conservation appropriations be reduced, has a man in his organization who knows practically every farmer personally throughout the area served.

Many producers have over-stressed the value of agstone as an acid corrective and have failed to promote its other more important attributes. The product should be sold strongly on the basis of its fertilizing values, in supplying needed calcium and magnesium, and on its contributions to soil structure and making other nutrients available to root and plant



Quarry operations of the Reed Crushed Stone Co., Gilbertsville, Ky.

growth. Other factors like trace elements should not be overlooked in sales promotion.

Soil testing continues to be one of the best approaches and the ordinary farmer needs outsiders to perform this function for him. The comparative benefits of commercial fertilizers and agstone also must be clarified in the mind of the farmer so that he will understand how each complements the other and appreciate the fact that results from liming require more time. Many farmers are prone to expect all the results to come from the immediate crop.

Other approaches are to stress the health angle which suggests a procedure to sell the farmer's wife and the general public. At least one producer has instituted a plan to finance the farmer for improvement of his farm which is a full-package financing plan including fertilizer and liming material. This plan is widely advertised by this producer and seems to have a great deal of merit since it also yields the producer interest on the loans.

Some of the most interesting remarks on what should be done and methods which have worked best in promoting sales are as follows:

promoting sales are as follows:
Okla.: "There can be many approaches to convince the farmer to buy agricultural limestone and other soil improvement materials. The one approach uppermost in my mind is for the A & M colleges in the various states, as well as other farm organizations, to continue giving technical information and television programs that will show he can get more benefit financially by using soil improvement materials and producing a product that is higher in quality and quantity and this should make a higher demand and better market for farm products. As a matter of fact, farm products should be measured and sold by protein content.

"The most effective method of promoting sales is through government payment of a large percent of the cost of agricultural limestone and fertilizer. Next important is television advertising and personal contact."

Ohio: "I think that other benefits of agstone, besides being a soil sweetener, should be pointed out to the farmer. Some of these additional values could be trace elements and the value to plants themselves and the consumer, be they animal or hu-More up-to-date information should be made available to farmers by State Experiment Stations through their various methods of distributing their information. They have been doing this quite some time for fertilizer. For example, when these people talk about agstone, why don't they explain about the large amount of agricultural limestone necessary to put any soil that has a pH of 5.5 over 7.0 pH instead of always talking about the disastrous effect of overliming. Over-fertilization does harm to the soil too, but do you hear much about this?

"Newspaper advertisements should be used, calling the attention of the farmers to specific fields of certain crops where plenty of agstone was used, in areas where it is quite evident agstone was as much or more beneficial than anything else to make a good crop. Pamphlets prepared by our own company, quoting information obtained from agricultural colleges and private enterprises that can vouch for certain values of agstone, such as we recently prepared a couple of years ago on dolomitic agricultural limestone are valuable.

"These are a few of my ways of thinking but I personally have always had 'a mad on' at the way most governmental agencies other than P.M.A. will always put out the same old idea of the last twenty-five (25) years, that all agstone does is sweeten the soil. Why can't they get up-to-date the same as some private industries

do today on new ideas? I am sure it isn't only the lack of money on the part of the governmental agencies that is most serious."

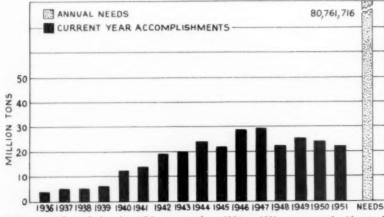
Ohio (limestone distributor): "The limestone industry in its price structure should figure a sales cost to pay for good salesmanship like any other industry does. This in most cases has not been done. The industry has depended too much on government bidding which I do not believe has sold the amount of liming material that is needed for good agriculture. Under this system the farmer only buys or takes delivery of the limestone which the government has allowed him. The dealer or distributor is satisfied with this small order and both he and the farmer feel that they have done their part but they are kidding themselves.

"Buying agstone is a good investment. We have all sorts of information from experiment stations, soil conservation experts, county agents and many other sources that every dollar spent for liming material brings in three dollars in return and many times more. This is three hundred percent on your investment—a pretty good return even if you have to borrow the money to buy the material. Any good businessman would go for this kind of an investment. Farmers should be good businessmen.

"Some of the limestone producers might again appreciate good salesmanship if all appropriations were dropped. We have all sorts of agencies helping us sell limestone. We should take advantage of these. They are: All soil conservation service personnel, farm planners, soil conservation district supervisors, county agricultural agents, experiment station personnel, farm magazines, friends of the land, sportsmen's clubs, fertilizer, machinery and feed salesmen, industrial agricultural agents and many others. This help is all free and they will all talk agricultural limestone if they are properly informed. The limestone industry has more help in selling agricultural limestone than any other industry that I can think

Va.: "We would say that our approach would be that of attempting to convince the farmers of the returns in profits by the use of proper application of high grade agricultural limestone. Our most effective method of promoting the sale of agricultural limestone is through the county agents and the agricultural colleges of the individual states."

Ohio: "We believe in basic education by means of group meetings, personal contacts and demonstrations at county fairs with the aim to prove that liming is a necessary and profitable operation for the farmer to follow. If he realizes the value, it would



Liming materials applied under A.C.P. program from 1936 to 1951 as compared with actual needs of the soil. Figures prepared on standard ground limestone equivalent basis by National Lime Association



Some samples of advertising by the Piqua Stone Products Co.

reward him in so doing out of his pocket, from an investment viewpoint.

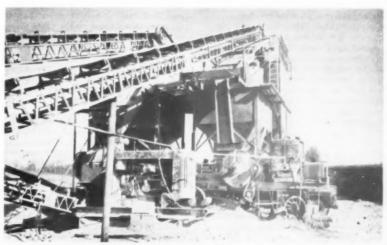
"Our most effective method of promoting sales is a constant newspaper advertising program through the use of actual farm photographs outlining various practices showing the individual benefits derived by farmers through the use of agricultural limestone. We also use films such as the narration of Doctor Albrecht, "The Other Side of the Fence," in public schools, before agricultural students and various club and church activities where the approach is made to men, women or children. The newspaper advertising creates a neighborly atmosphere which develops the comparison of one farmer's success with that of others and in turn denotes a competitive atmosphere of performance."

Fla.: "I believe the proper approach, in order to induce farmers to buy agricultural limestone out-of-pocket, is more personal solicitation, more advertising and a more generous use of soil analyzing. Unless this soil analysis is done for the ordinary farmer, he is inclined to put it off with the result that the analysis is often never made. Our most effective method of promoting sales has been direct solicitation, advertising and maintaining a laboratory for the analysis of soil samples."

Penn.: "Direct sales work with the farmer is the best approach. After the contact has been made, get him in the field and find out, by soil test, if his soil needs agstone. If the soil needs liming, like any other job of selling, he must then be made to want that field limed. Every farmer is interested in talking about agriculture. If the salesman has a sound agronomic background, he has little trouble in talking to and convincing the farmer of a sound soil and crop fertility program. A trip to the field is mighty helpful in judging the fertility level of a field. Slides showing before and after treatment do an excellent job. It is always sound practice to show the farmer how he is going to reduce the cost of production by a sound fertility program. If he isn't willing to go along on an all-out program. get him to go all out on at least half the field; and he will sell himself. Above all, his complete confidence in you (the salesman) is essential.

Mich.: "To induce a farmer to purchase agricultural limestone out of his own pocket will indeed be quite a struggle. The farmer who is truly interested in building up and maintaining his land to the highest degree possible will do so without a question. On the other hand the comparative benefits derived from liming in addition to the use of commercial fertilizers must be stressed and encouraged.

"Our personal method of promoting sales has been to strive to make all the arrangements necessary to get the material to the farmer with the least effort on his part. We have set up dealerships in strategic locations and urge these dealers to give the consumer quick and dependable service



J. T. Leonhard Construction Co. plant near Mediapolis, lawa. Plant produces 30,000 tons of agricultural limestone and 64,000 tons of road stone annually



Crushing and screening plant of Raid Bros. Construction Co., near Augusta, Iowa

throughout the entire year. Our sales staff makes every effort to obtain favorable trucking and freight rates to cut down on delivery costs. And as a manufacturer we try to produce a product that is economical to purchase and easy to spread on the land."

Mich.: "Probably the main approach should be the financial return on the farmers' investment. However, there are two other approaches which are important, namely: the farmer's inherent love for the soil and the urge to leave it better for his heirs, also patriotic reasons."

W. E. Stone, Piqua Stone Products Div., Armco Steel Corp., Piqua, Ohio, who is chairman of the N.A.L.I. promotion committee commented as follows:

"In trying to sell agricultural limestone we are often asked the question. 'If agricultural limestone pays as well as records show it does, why hasn't every farmer limed every square foot of his ground?' This is a big question-one for which we have not found the answer. In fact, we today on a national level, according to the United States Department of Agriculture, are selling around 30,000,000 tons of agricultural limestone annually where, according to their analysis of the entire need, we should use something like 495,000,000 tons to bring our soil up somewhere near the optimum mineral level and then we should be using 50,000,000 tons a year to maintain this level. With this apparent need and with the proved return from the limestone investment, certainly it is hard to figure out why we are selling only half of the tonnage which is required to even maintain our mineral level.

"Some of us, who have been interested in promoting and selling agricultural limestone for 30 years and more, have seen a lot of work done on research, education and demonstration. The demonstration method should be and is effective to those who

will attend the demonstration meetings, but those who attend are the ones who are possibly already sold on the idea. In other words, they are the leaders. The others we cannot reach by this method.

"We have, through the years, tried to sell agricultural limestone strictly from a money-return approach and while it has appealed to the few, there are many yet that we are not reaching. Apparently our approach has not been as effective in competition for the farmer dollar as have been other items such as new machinery, automobiles and so forth.

"It becomes apparent then that there must be some other appeal and we have started to stress the value of liming from a health angle to the family. We believe the health angle is important and that if the program is properly set up and the appeal is made to the farmer's wife that she in turn can be quite influential in influencing a desire for liming.

"The United States Department of Agriculture is coming out on a national level for a 'package program' for conservation and rebuilding in which it is stressing both limestone and fertilizer. I believe then that if we come down through the state level, to the county level, and then to the local level that the fertilizer interests and the limestone interests should unite in a promotion program which will be beneficial to both industries and at the same time will be accomplishing the results which we are both after.

"In our own advertising we are doing quite a lot of direct advertising which we have used throughout the years and feel that possibly we are slowly getting results. We urge the farmer to have his soil tested which service we render free of charge. We not only test for his liming needs but also give him tests for phosphorus and potash and recommend to him a fertilizer program which should give maximum results. This testing service takes time and seems a slow way to accomplish our ultimate aim but

our experience convinces us that this testing is worth while. The testing is rather simple but with the test and working with the agronomists at our own state college, we think we are giving the farmers good advice on both liming and fertilizer needs.

"Freight rates have hurt many of us in moving tonnage into the territories we have developed through the years. We are now forced largely to get our tonnage within a radius of 40 to 50 miles of our plant. This brings in our local truckers who deliver and spread the limestone on the farmer's field.

"With direct mail in this area, close contact with the truck owners and their drivers and this free testing service for truckers and their customers, we feel that we are slowly building business to replace that which we have lost in car shipments. This local business we feel we can hold and continue to build. The soil conservation payment has had an important part in getting many farmers started to liming. If these payments were reduced or eliminated I feel certain that agricultural limestone sales would drop immediately not only for us but for the entire industry.

Ohio: "I think there are three things that will have to be emphasized in approaching the farmer for out-ofpocket purchases of liming materials:

a) "I believe we will have to stress the importance of high yields to reduce the cost of production per unit. In other words it will resolve itself into intensified practices and farming less acres with less labor.

b) "We will have to emphasize the importance of calcium and magnesium and the necessity of producing food and feeds well fortified with these minerals, which are vital to the health of the nation.

c) "The preservation of our soils is extremely important and one way to help maintain them is by the establishing of good grass and legume sods. Good sods are the basis of good farming and form a protecting cover that helps to protect soil losses through erosion.

"Our most effective method of promoting sales has been through established dealers, which was started many years ago. We suggest to our dealers that they solicit customers and prospects in their respective territories. Some of them do, but many do not and wait for their customers to call and place orders. I think this has happened because business has been good for the past several years, but now that there is a possibility of a change I am certain that they will all have to get out and hustle for orders. To assist our dealers we advertise on the radio and in local newspapers and distribute some literature to mailing lists supplied by the dealers. We are always available to speak and show pictures at local farm meetings and this has been very helpful in promoting our sales and public relations."

Ky.: "For the past several years, we have not had to think too much about selling agricultural limestone. Our problem has been to meet the demand. However, with new quarries opening up, the price of farm products falling, etc., we realize this situation will be changed.

"Constant contact should be kept, insofar as possible, with the various farm organizations, such as 4-H Clubs, Future Farmers of America. Grasslands Program, Homemakers Clubs, and high school groups. A good speaker connected with a quarry organization, and available for different type programs with Kiwanis Clubs, Lions Clubs, Rotary Clubs, farmers meetings, either offering an educational talk or one of entertainment would be an asset. A farmer who is acquainted with quarry personnel, and has been entertained by them will talk and think in terms of the quarry products.

"Field day groups should be encouraged to visit the quarry and observe operations. Personal acquaintance with county agents, soil conservation agents and with farmers is desired. Send out a mailing at least six times yearly of promotional literature, with a personal message typed thereon. Advertise in local papers."

Tenn: "I think that the best approach to the farmers to induce them to buy agricultural limestone out of their pockets is to very forcibly show them that agricultural limestone actually makes them money in increased production. This approach is the same principle used by limestone producers in buying new equipment which they are convinced will cut costs, etc., and make more profit for them in the long run.

"We have done considerable radio advertising through our local station at Winchester, Tenn., which covers an area of some 50 miles. We have also at times carried the message to the farmers through our newspapers; however, we have not used this means very extensively. About a year ago we added a salesman to our organization with the idea that he would spend a good deal of his time actually seeing and talking to various farmers, particularly the most influential ones, so that they in turn might talk agricultural limestone to their neighbors."

Ky.: "To induce farmers to buy agricultural limestone out of their own pockets is largely an educational problem. The agricultural agencies are working wonders in this respect. For example, many of our counties are establishing soil testing laboratories and the farmers are using them. Our most effective way of promoting sales has been through encouraging and working with local truckers. By local, I mean people who are well known in the communities which we are serving."

Kan.: "I would like to make the general statement that results from the use of agricultural limestone are not immediately available and therefore it becomes a long-pull proposition which must be stimulated by subsidies to tempt the farmer to learn of its ultimate results.

"I believe it is necessary to dwell on the results which have been obtained, by directing the farmers' attention through all media of advertising that the return is \$10 for every \$1 invested. Our most effective method of promoting sales is by direct contact, direct mail and testimonials from satisfied customers."

Mo.: "Over half of our agricultural limestone was purchased directly by the farmer or as cash purchases in the year 1952. Sales meetings with the farmer, advertising through papers and our own "Southwest News" were used when the appropriation was cut before and they all helped.

"If soil conservation appropriations should be reduced or eliminated I believe the industry as a whole would be affected adversely as much as 50 percent. Looking forward to just such a possibility we instituted a plan over a year ago wherein we financed the farmer for improvement of his farm. making this a full-package financing plan, including the necessary fertilizer and liming materials to bring the mineral content of his soil to its maximum producing level. We believe this is the final answer to any cutback in federal appropriations." Announcement of this program as advertised in the "Southwest News" is shown herewith."

N.Y.: "Agricultural limestone should be popularized. More factual data should be used in advertisements. Also, there should be more articles written in popular farm magazines every month.

"The most effective method for promoting sales is personal farm contact with field soil testing for pH done on the farm. Giving information about fertilizers and seeding mixtures is very essential in order to get the best results from the effort put forth making liming recommendations."



Promotional material of Southwest Lime Co., announcing a financing program for a soil improvement plan III.: "The only approach that could possibly be used in selling agricultural limestone would be one of education. By 'education' we mean simply to demonstrate through movies, radio programs and other media, that agricultural limestone is necessary and proved highly successful in modern farming. In other words, we already have the proof—now let's show it to the public.

"In our business we rely on radio and bill-board advertising. We feel that no one type of advertising could be singled out as being the best and feel that a real advertising program should include at least two and possibly more methods."

Okla.: "With reference to the best approach that can be used in order to induce farmers to buy agricultural limestone out-of-pocket, we are of the opinion that this purpose may best be achieved by continually pointing out to the farm population the advantage that will accrue to them by using agricultural limestone. This can best be shown by actually illustrating some examples where production of certain farm crops was greatly increased by adding the required amount of agricultural limestone to the soil and this in turn resulted in a much greater rate of income to the farmer. A secondary emphasis should be placed on the benefits to both the state and the nation by a constant soil improvement program."

Mo.: "The only worthwhile approach is using Land Grant College Experiment Station data on agstonevia radio, newspaper, bill-board, flyers, mailouts or TV. The dollars and cents story must be told frequently by limestone producers—"3 to 1"—"Mr. Farmer, you cannot afford to pass up agricultural limestone, the college says so' approach will keep our business on a solvent foundation. I am a former county agent and am positive of this being the plausible, sound approach to sales on a high level.

"There are no 'most effective' sales media. Sound use of newspaper ads, radio, mailouts are universally good. Bill-boards help some. Of great importance is the 'over-the-fence' talk between farmers which accentuates the importance of high quality agstone, and freedom from dirt and over-size material that can be easily spotted on the top of a spreader-bed truck. Friendly relations with the county agent, PMA committee, and other agricultural officials will do more than all the newspaper ads in the area."

lowa: "Sales methods for promoting agricultural limestone have been thoroughly discussed at trade association meetings, but as you have pointed out the methods have not been as effective as they should be. There

is no question as to the need for agricultural limestone. The facts have been brought out by colleges and various governmental agencies. These facts, however, have not been collected or assembled or presented strongly enough, or in the correct manner, to convince Congress or the farmers of the seriousness of this problem. There are too few aggressive farmers who buy agricultural limestone on either its economic or conservation value. "The limestone practice is, in a sense, an intangible, permanent conservation practice. As such, it becomes an educational program for what I feel is a heavy majority of the industry's potential farmer-market. By reason of the low plant selling price and low producer margin of profit, many producers cannot or will not spend the necessary funds to promote, educate and sell limestone. Right or wrong, this responsibility has fallen back to the colleges, extension services and other farm agencies and they have done an equally poor job of recognizing the importance of agricultural limestone as a conservation prac-

"Referring again to the agricultural limestone market, there is some minor percentage of farmers-maybe 20 percent-that always has and will buy agricultural limestone on its conservation and economic value. The balance of the potential market-maybe 80 percent-is made up of three general groups. One group constitutes the business and professional man who has invested his money in farm land. In many cases this type of owner has re-invested profits in something he can see and be proud of, such as physical improvements. He has done this at the expense of not buying limestone, largely because he can't 'see' it and because no one has told him the limestone story. The second of this majority group is the tenant farmer, which may or may not tie in to the first group. This man is a little better informed and, in many instances, would like to see limestone applied to the farm; but he is unwilling to invest in a conservation practice on any given acre that will last 6 to 10 years when he is on the farm on a year-to-year basis. The last of this majority group is the young farmer, or the son of a farmer, that is just starting in business. In many cases the limestone dollar is competing against a new car, a refrigerator or machinery or a baby buggy. As time goes on, this man will eventually buy some limestone; But again, it is an intangible product to a degree and these dollars are going for something other than limestone.

#### Obstacles

Among obstacles to selling agricultural limestone most frequently mentioned by producers are lack of funds to conduct a high level selling program, high transportation and spreading costs, and inability to meet seasonal demands. The margin of profit per ton in a highly competitive market is too low to permit an adequate sales promotion program and employment of sales personnel, for many producers. Building of stockpiles in strategic areas seems to be the best solution to high transportation charges as well as aiding in meeting high seasonal demands. The practice is also effective in good relations with truckers by virtue of enabling them to make more hauls per day.

Lack of scientific knowledge on the part of farmers was mentioned by several producers as the chief obstacle to be overcome. Many farmers believe that all the liming material needed is what is given to them, many expect immediate returns like they experience with fertilizers, some assume their soils to be up to standard and many have no knowledge at all as to the merits of liming. These reasons as given merely are proof that the farmer's education has been neglected.

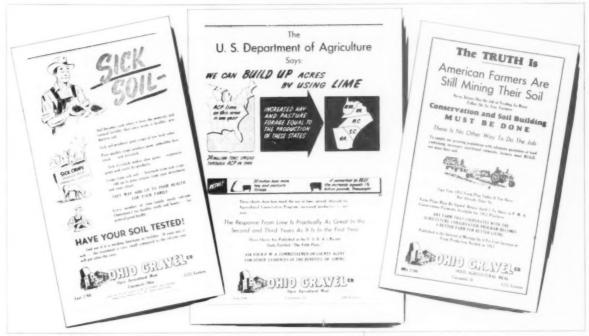
There is increasing evidence that some agricultural agencies are hurting the cause by stressing the dangers of "over-liming" where, overall, the real danger continues to be inadequate liming. Declining farm prices and greater competition for the farmers' dollar are having their adverse effects which emphasizes the great need for competent sales representation. Tenant farmers, who refuse to invest for benefits to come in the future, are difficult to sell. Some producers have suffered because others have delivered sub-grade material and there have been poor spreading jobs. Among other difficulties have been government red tape which has discouraged farmers who resent being regimented in order to qualify for government aid.

Among the obstacles mentioned were the following:

"Chief obstacle to our selling agricultural limestone has been lack of scientific knowledge by the farmer and the money to pay for it."

"Our biggest obstacle has been getting agstone to the field at the time the farmer wants it. It has been a rather seasonable business. We have been overcoming this by putting in large stockpiles of 1000 to 5000 tons in the area not over ten miles from any point of delivery. Our average hauls have been four and one-half miles. These large stockpiles have also helped greatly to advertise the agstone. The farmer sees the same material he is going to get and knows the trucker is bringing him a good grade. Truckers also haul more tons per truck per day under this system.'

"The chief obstacle to selling agricultural limestone is the high cost of rail and truck transportation."



Samples of agricultural limestone advertising by the Ohio Gravel Co. which present down-to-earth information

"Our obstacle has been that we have only a limited tonnage and that farmers require this material on a seasonal basis making it difficult to serve them and at times being unable to meet the demand. We also have a product which is not as high in quality as other producers and can do a better job especially in spreading if it were possible to overcome the accelerated rush periods."

"We have found that the chief obstacle in selling agricultural limestone, beyond the amount that is furnished by PMA, is that the average farmer considers it is only necessary to use the amount that is given to him without cost."

"Not being able to see enough farmers is our chief obstacle. This year we have put two additional men on the road. The more contact work that can be done, the more limestone we will sell."

.00

"Our chief obstacle in selling agricultural limestone has been a negative approach to liming on the part of one of our top agricultural agencies in the state. Their mere suggestion of the possibility of over-liming has indeed had a direct bearing on our sales volume. To overcome this will take a concerted effort in advertising and education as to the remoteness of such ill effects. Under-liming is by far the greater danger to combat, and will no doubt require the full time effort of a qualified representative of the agricultural limestone in-

dustry. I believe this method is already being utilized in other states, and is the plan to adopt in our local problem."

"Our chief obstacle to selling agstone is the fact that too many farmers want their material at the same time. Early spring seems to be the favorite time that they want it which is a time when we can neither get on the fields to spread or on the road to haul. If the farmers had a place to put agstone at any season it certainly would stimulate sales. The Extension Department could do us a lot of good along that line."

"One of the chief obstacles that I have experienced in selling agricultural limestone is the fact that the results from its use are not immediate as is the case with fertilizer. The full benefits from the limestone are not received for two, three or four years. Another obstacle is the competition for the farmer's dollar for the many things he buys; necessities as well as luxuries. When his income is reduced he is inclined to purchase things other than limestone.

"How to overcome the first is not very difficult, especially if the farmer has used agstone on his farm and experienced first hand just what it will

"The second obstacle can be overcome by more advertising and personal solicitation. The advertising budgets of most agricultural limestone companies are small and I am certain that to do a good job more funds will have to be used for this purpose. The commissions for selling agricultural limestone have always been extremely low. If commissions could be increased so that it would be more profitable to dealers I am certain that they would put forth more time and effort in contacting prospects."

"The chief obstacle to selling agricultural limestone is by far the rapid increase in freight rates. The cost of hauling and spreading has also advanced. These two factors discourage the purchase of agricultural limestone."

"The chief obstacle to selling agricultural limestone in my opinion is just that some of the farmers do not want to take any money out of their pockets, and they think they can slide along for another year or so without using agstone, hoping they may be in a better financial position by next year, etc. Of course, in my opinion this is shortightedness on their part, as they are losing the additional production they might have through the use of this material."

"Our chief obstacle is absentee landtordism which necessitates the farms
being run by renters who cannot afford to apply a long-lasting product
like this except on a long term contract from his landlord. Furthermore
agstone, to be most effective, should
be used in a legume rotation and the
renter feels that he must have quick

(Continued on page 184)

## AGRONOMISTS' IDEAS

## On Selling the Farmer

THE VIEWS OF AGRONOMISTS as to a course of action for the agricultural limestone industry were sought since they are the sources of the factual data so necessary to the job of sales promotion. Herein, we publish letters (in part) as received from some of the leading state agronomists. Others have written short articles at our suggestion, which are published separately elsewhere in this issue. Comments from letters were as follows:

"It has been apparent for several years that the use of agricultural limestone by the states was closely correlated with available funds for A.C.P. payments. Producers didn't have to 'sell' their product. Neither were they particularly concerned with the problems of improving quality or distribution and this was a serious mistake.

"The research and teaching personnel of all colleges and universities have constantly stressed the use of agricultural limestone on acid soils as the very foundation of a sound soil management program. They will continue to do so. It is up to the producers and their state associations of limestone producers to use the research information and actively cooperate in the educational programs. The results from agricultural limestone are not so glamorous as those from nitrogen and certain other nutrients; nevertheless, they are of great importance. The truckers need to be well informed relative to the need, value and desirability of proper distribution of lime. A satisfied customer who knows that he got a good product, well distributed, is your best salesman for the future.

"The current sensational returns from investments in fertilizers and the possible reduction in A.C.P. support will be critical factors to consider at this time. This situation will iron out in the future. It will be a question of close cooperation between industry and all educational agencies to carry on a most effective educational program."—B. F. Firkins, Professor of Soils, Iowa State College.

"We are fortunate in this state in having had early leadership such as Doctor Hopkins and Dean Davenport, who gave Illinois a strong start on a limestone program more than 40 years ago. The first agricultural limestone used in Illinois was applied on plots on 10 soil experiment fields established in the period 1902-1904. Through the years we have had 25 or more soil experiment fields located on different soil types in different

sections of the state. These fields have played an important part in promoting the use of agricultural limestone. They have furnished the limestone information for circulars, newspapers and magazine articles and they have also served as demonstrations where farmers are invited to come and see the effect of limestone on the growing crops. Field meetings are held regularly on these fields.

"Another activity that has been an important factor in promoting the use of limestone in this state has been our soil testing program. A soil testing project was first organized in 1923. This project has been a major activity of the extension service since that time. In the early days farmers were taught how to test their soil for lime needs through community soil testing meetings. These meetings were under the supervision of the farm adviser and farmers were shown how to make the tests and how to draw the maps showing the limestone needs of their fields and farms. For the past eight years our soil testing has been carried on through soil testing laboratories. There are now 80 of these laboratories under the supervision of the counties in addition to 20 commercial soil testing laboratories. The county laboratories have been sponsored by the farm bureaus and are under the direct supervision of the farm adviser. The testing in these laboratories is done by a trained technician with the farm adviser making the recommendations. In addition to testing the soil for lime needs, these laboratories also test for available phosphorus and available potassium. For several years these laboratories have been testing from 11/4 to 11/2 million acres of farm land each year.

"We have always considered soil testing as a necessary part of any intelligent soil management program.

· WE HAVE ATTEMPTED herein to point up some of the problems in getting farmers to buy more agricultural limestone. Producers and agronomists have contributed many suggestions in answer to our request for participation in this discussion for which we are highly appreciative. Many thoughts have been brought out which we believe to be practical and worthy of reading because it is becoming apparent that merchandising is without question the most important function of the industry today .- THE EDITORS

It tells farmers not only where liming material, phosphate and potash are needed, but equally important, it tells how much of each is needed to the acre. Soil testing, in addition to giving farmers valuable guidance in their soil treatment program, has always been one of the best methods of selling limestone.

"Another important contribution to the agricultural program in this state has been the trucking and spreading service. A low cost and convenient trucking and spreading service is now available in every community in the state. Along with this trucking and spreading service various types of automatic equipment for unloading agricultural limestone from the car to the truck have been developed. This has made it possible for the trucker to handle limestone easily and rapid-

"Our farmers have been using 4 to 5-million tons of limestone annually for the past eight years. Farmers are generally convinced of its value. However, there is strong competition for the farmers' dollar, so it will be necessary to continue selling if agricultural limestone is to get its share of that dollar. With the testing of more than a million acres each year and with a convenient trucking and spreading service available in every community at a reasonable cost, we believe that we have an aggressive selling program that will continue to get a large tonnage of limestone used, even though the government financial aid

is withdrawn.

"In our epinion, a practice that is as profitable as liming should be able to stand on its own feet. If an aggressive selling program by the industry and a well organized educational program of the colleges cannot sell farmers on the use of agricultural limestone, then there is something seriously wrong with our educational and selling program. Back at the time the triple-A agricultural limestone program was started, there was a need for financial assistance. because of low farm income, and another similar period may come when financial assistance will again be needed. It might have been better if we had discontinued the help during these prosperous years and saved it to use when there may be a greater

"The agricultural limestone producers also have an important stake in all phases of the soil-building program. If the farmer fails to put on phosphorus or potash or fails to put on enough of these materials where they are needed, or fails to grow leg-

umes, the limestone may be of little value to him. Then too, the agricultural limestone producers are also directly concerned if the fertilizer program is inefficient or if the farmers are being sold fertilizer materials at too high a cost. The limestone industry needs to study the fertilizer programs and use its influence to see that there is a balance between agricultural limestone and fertilizers. It might be worth while to consider the appointment of a committee to study not only the methods for promoting the greater use of agricultural limestone but to study the fertilizer programs in various states."-C. M. Linsley, Professor, Soils Extension, University of Illinois.

"I believe you have cause for alarm if supports are reduced, for we have noted that the use of liming materials decreased in the years when the P.M.A. had less money to support the program.

"As far as our Extension program is concerned, the liberal use of agricultural limestone is strongly recommended for forages on all livestock farms and for most vegetables. Because potato scab and tobacco root rot are favored by reduced acidity in soils, small amounts of liming material and very careful spreading are recommended.

"Since the untreated soils in Connecticut average about pH 5.0, a general recommendation is 3 tons of limestone per acre for forage crops and vegetables and an average annual application of from 500-1000 lb. to maintain the acidity at a low level, namely, pH 6.3-6.8.

"Recently a statement came to my attention which may be of help in getting liming material used: 'Some fertilizers may not give increases in yields but do prevent decreases.' In other words, one might skate along on thin ice for a considerable period but eventually there is likely to be a sudden plunge into icy water and it may take heroic measures to rescue the victim. There have been a few occurrences of such cases on potato farms where the use of lime is usually shunned. It really is a problem to restore the productivity of these soils without liming so heavily that scab becomes prevalent."-B. A. Brown, Agronomist, The University of Con-

"More limestone will move out to give more effective service as soil treatments on the individual farms when the sale of this requisite of protein production in feeds, and thereby in animals and their products, is put on the merits of this product and when it ceases to depend on federal subsidies and to make itself no more than just a business transaction. This is just another way of saying that the limestone industry must know



This plant of George M. Baker Co., Lockwood, Mo., produces 600 tons of road stone and agricultural limestone every day

what the agronomic values of limestone are. They must no longer depend on agronomists to sell the limestone.

"While the agricultural limestone producers are schooling themselves in the merits of limestone they may well use only the most recent and the most fundamental concepts, as we now know them. They may well emphasize what service the limestone renders and the methods by which this is brought about. Some of these concepts are the following:

 "Limestones are a requisite in regions of rainfall high enough to have made soils so highly leached of their contents of calcium and magnesium that these must be supplied before the protein-producing, and the nitrogenfixing forage crops can be readily grown.

2. "Agricultural limestone is no longer viewed as ammunition in a fight on soil acidity because this soil treatment carries a carbonate that lessens the degree and the total of the acidity in the soil. Rather limestones are fertilizer treatments supplying calcium, or both calcium and magnesium, as essential nutrients for plants and soil microbes.

3. "Calcium is required to a higher degree than any of the other essentials as its part in the capacity of the soil complex holding the different exchangeable or available nutrient elements. Its ratio to magnesium, for example, is equivalent to about ten to one, while to potassium it may be as much as thirty to one, when the protein-producing crops are considered. For this reason, larger amounts of agricultural limestone have been going on soils than the treatments providing other fertilizer elements. Also for this reason, we have been reluctant to view liming as the equivalent of a fertilizer treatment of much smaller amounts going on the soil.

 "Agricultural limestone in its finer fractions (hundred mesh) has been rapid enough in its reaction with the soil to be the equivalent of a starter fertilizer. In its particles coarser than the hundred mesh, it has been a reserve mineral being slowly processed by the clay acids, decay acids, plant root and other acids to be a sustaining fertility. This is nothing different than what the other reserve minerals in the soil have been while supplying potassium, phosphorus and other elements, whether originally in the soil, or blown in by the wind, or flooded in by water. Limestones are reserve or sustaining fertility for longtime service and not starter fertilizers only.

"The limestones are important because they are carbonate minerals of sufficient stability to be moderately lasting, but yet not too stable for reaction with the acid of the clay colloid, of the plant roots' respiration or of microbial origin. That limestone is a salt of carbonic acid may be more significant than we yet realize. To date we have not yet learned much about the carbonate, or this negatively charged ion in the soil as it may represent a much more favorable soil situation by its abundance in the soil than is probably true were chlorides and sulfates much more abundant.

6. "Calcium present at a significantly high level in the soil is a means of mobilizing other essential elements into the plant root. This needs to be appreciated as a fundamental fact. Much that the root does in determining the migration of the different nutrients into it is related to the supply of active calcium in the soil. This results both because of the nature of the root and the protein contents of the plant in connection with the calcium's functions. That a protein-rich legume root should represent a more potent means of getting fertility from the soil is not commonly recognized. It is by virtue of the legumes getting more elements from the soil that they can create higher feeding values in their crop contents. It is in

this nutritional service by calcium (or magnesium) to the plant that the limestones play their major role and not in removing the acidity or active hydrogen of the soil by their carbonates.

"Calcium and magnesium in the soils are more actively moved into the plant root when they are associated with some acidity rather than with complete neutrality of the soil. It is for this reason that making soils neutral makes the calcium less effective. to say nothing about a soil highly loaded with calcium holding relatively too little of all the other essential elements. Along with the sale of any goods there must go the assurance to the customer that he will be well enough informed by the salesman, the manufacturer, etc. to obtain the full service of the goods purchased. The selling of agricultural limestone calls for 'servicing' the customer. Just as soon as producers fully understand the merits of their product and follow through on the sale to explain fully what service their product performs, then more limestone will be sold.

"Relative to subsidies, We thrusting back to the farm and the farmer many aspects of these and costs of soil fertility maintenance which are not fully understood. In fact, we have one kind of economics for the farmer who buys a stock of merchandise in a store on main street, and another kind of economics for the farmer who buys a stock of fertility out on his farm. The man who is on main street can sell his products so as to maintain himself perpetually in the business there. The farmer must sell his product while liquidating his fertility assets under the guise that he is taking a profit. Consequently the farmer is sold out, and his farm is too, in one generation." Wm. A. Albrecht, Chairman, Soils Dept., College of Agriculture, University of Missouri.

"I think that you will agree with me that farmers at the present time are quite price conscious. They have seen many of their products decline considerably in value during the last few months and at the same time they have noted no lowering of the costs of their production. This is certainly going to make them more conservative in their attitude; so I feel quite sure that if some shock should come rather suddenly in regard to the present program that it would greatly curtail the use of limestone at least in the immediate future. I am certainly not saying this simply to appear pessimistic but to rather face a real issue.

"Of course, we in our extension ac-

tivities will do all that we can to stress the fundamental need of liming as a basis for good crop rotations and particularly establishing the legumes and for a general high level of productivity of all crops. We continue to do this in almost every public address that we make particularly relating to phases of soil fertility.

Our farmers here in Indiana are making more and more use of the services of our Soil Testing Laboratory, and I believe that the industry should get back of this soil testing movement, as it is going to get limestone applied to the land where it should be applied and maybe avoid the mistakes of over-liming some areas that may happen in the absence of sufficient information. I think there is opportunity for the industry as well as the truckers to become acquainted with these services and to encourage farmers to make use of them. In a few sections of the state where we have rather long hauls, the farmers have become concerned with the coarseness of some of the agricultural limestone that they have been getting. As a result some action has been taken in the legislature to get a new limestone labeling law somewhat similar to that on fertilizer. I believe that this is resulting in a commission to study this matter in the interim and to report to the next legislative session. So, if the producers can come out to the farmers and say that they are meeting all of the standards by which the P.M.A. has been buying this limestone and going even beyond that it will be an additional inducement for the farmers to continue the purchase of this material.

"There is no question in my mind that Indiana farmers are sold on the variety of limestone, and that they will continue to use it. However under a period of deflation, I am not sure which of the soil fertility treatments they are going to curtail more, whether it be fertilizer, liming or some other item of cost. In this competition at least for the short pull, I think liming would suffer relative to the use of fertilizer."—M. O. Pence, Extension Agronomist, Purdue University.

"Any industry that accepts any kind of subsidy from the federal government operates in continuous peril, since there is no way of knowing when the subsidy will be withdrawn. Under conditions of subsidy a lot of under-financed and inefficient producers get started, so any benefits that might be derived from the subsidy have to be shared with more units of the industry.

"Unless agricultural limestone can be sold on the basis of merit and without subsidy, its future looks speculative indeed. For it is important to keep in mind that high acre yields of most crops can be produced on acid soils without use of limestone. Possibilities for profit are increased by regular applications of limestone where it is needed, and crop quality can often be greatly improved by its use. But the industry would do well not to become complacent about the absolute essentiality of its product. A surprisingly large part of the world's food and feed is produced on acid soils.

"One of the important reasons why fertilizers occupy such an important place in our agricultural economy is that a lot of men are being well paid to sell them. These men do not depend upon the agricultural press, the county agricultural agent, the agricultural college, and the experiment station staff to visit them. The result is that fertilizer tonnages have been steadily moving upward, whereas agricultural limestone tonnages are having difficulty holding their own. Within the next two or three years we shall be using more tons of fertilizer than agricultural limestone in the United States.

"In so far as extra fertilizer is being used to replace agricultural limestone, we have a false and unduly expensive system of soil management. We need to have more limestone applied to the land for the sake of the land itself. Limestone aids better root systems, to provide larger amounts of organic matter at some depth in the soil, to keep the soil in a better state of aggregation, and to enable the rain to soak into the soil rather than to run off the surface, carrying good topsoil with it.

"But there is an even more important reason than this for using as much limestone as can be added to the soil to advantage. The calcium plus magnesium plus potassium content of a unit dry weight of any given species and variety of plant, expressed as milliequivalents, is essentially constant under standardized growing conditions. But the content of any one of these three elements can be made to vary within wide extremes. In the absence of adequate supplies of calcium, plants growing on well-fertilized soil tend to absorb excessive amounts of potassium. Alfalfa, for example, needs to contain only about one percent potassium. But if the calcium content of the soil is low and one adds plenty of potassium to take its place, the potassium content of the plant can readily be raised to three percent. There is no advantage to this either in the way of greater yield or better quality of produce. In fact the mineral value of the crop is reduced and the cost of production is increased. One equivalent of potassium in a complete fertilizer costs at least 15 times as much as the one equivalent of calcium in limestone that could replace it, up to a certain point, in the plant.

"What the agricultural limestone industry needs to do is to sell itself

on the importance of its own product. Then it needs to develop a sales program of the type that puts limestone where it belongs. A day seldom passes that fertilizer literature does not come in front of my eyes. I see advertisements of fertilizers in agricultural journals. I read about phenomenal effects of fertilizers in the metropolitan press. I read the house organs of producers and distributors of fertilizers. I am asked to give talks on fertilizers and to develop programs in which new developments in fertilizer research and its applications are

explored. Research fellowships are continuously made available to agricultural colleges by the fertilizer industry for the study of its products.

"But what about limestone? Every one of the 18,000 samples of soil that go through our New Jersey soil-testing laboratory every year is tested for its pH value. Farmers want to know about this. But the follow-up on low-pH value soils by agricultural limestone producers is insignificant in comparison with that by fertilizer producers to low NPK values. The agricultural limestone industry needs

to put more money into its own business by way of an intelligent research, advertising, and follow-up sales program. It needs to keep its product prominently displayed in the publications that all the people read. There is great need for joint effort on the part of the agricultural limestone industry to the end that everybody knows how important limestone is to the soil, to the crop that grows on it, to the animal that consumes the crop, and to man himself."—Firman E. Bear, Chairman, Soils Department, Rutgers University.

## **Must Continue Federal Program**

By C. J. CHAPMAN

THERE IS NO QUESTION about it—the use of agricultural limestone to sweeten the acid soils in Wisconsin has been a most important factor in pushing the acreage and yields of alfalfa to present all-time records. Wisconsin farmers in 1951 harvested nearly 9,000,000 tons of hay and in 1952, over 8,500,000 tons. The crop in 1951 was the largest in history, in fact, in both years the largest for any state in the United States. Fortunate indeed that we had some hav to spare this past year, for the farmers in the drought-stricken states south and east of us have taken our surplus by the thousands of tons to

feed their starving cattle.

Yes, and fortunate indeed is the fact that over the past 19 years farmers in Wisconsin and other states have been aided by the federal government in these broad programs of soil building and conservation. Our gigantic program of agricultural limestone production set up in part as a drought relief project under the F.E.R.A. in 1934, and converted into a W.P.A. "Work Project" in 1935, carried and prosecuted under this setup until the W.P.A. was abandoned in 1941, turned out millions of tons of agricultural limestone at cost to our Wisconsin farmers. And all during these years and right down to the present moment, farmers of this state and in all other states where acid soils need limestone have been aided by the A.A.A. (now P.M.A.) in earning soil-building credits by using liming materials. This program has added millions of dollars of new wealth to this state and other states. A subsidy? Yes, if you want to think of it that way, but a worthwhile one.

Let's continue to help our farmers carry out these long-time soil building practices. Pay farmers for "liming their soils?" Yes sir! Some of these soil building and conservation practices should be underwritten by the government. I am now arguing for a continuance of incentive payments for certain soil conservation practices by the government, and I

would include "liming acid soils" in the list of such long-term national welfare programs.

Well do I recall a conference back in 1936 that Dean Chris L. Christensen of our College of Agriculture and I had with Phil LaFolette, then governor of the State of Wisconsin. It was at the time we were battling to secure clearance in Washington for our Agricultural Lime Production Works Project. The governor and his brother, United States Senator Bob, were working tooth-and-nail to clear away some of the red tape and get "lime project" underway as a work project. Said Governor LaFollette, "Chapman, your lime production project is one of the most worthwhile of all the projects that have come to my attention to date. Here is a project," he said, "that will contribute millions of dollars to the future wealth of our Wisconsin farmers, enrich the land and more than anything else, it will give our farmers tax paying power in the years to come. And, believe me," he said, "they'll need it." How true were his words!

Two million acres of alfalfa harvested annually by Wisconsin farmers! And what is all that hay worth? Well, figure it out for yourself—5,000,000 tons a year at \$30 a ton. The 28,000,000 tons of liming material applied to Wisconsin's acid soils in the past 19 years made this possible.

I say, let's continue to help farmers carry out practices which are of long-time benefit to the country as a whole. Helping farmers to "lime" their acid soils and keep them limed up to a pH of 6.5 is an investment in the future potential wealth of this state and other states of the nation.

But we here in Wisconsin still say that yields per acre of alfalfa are not what they ought to be. There were thousands of acres of alfalfa this past year that were streaked and looked rather tough and beat out. On the sandy soils of central Wisconsin, hundreds of fields suffered from a lack of boron. In fact, there were thousands of acres in all parts of the state which were spotted and the



On a farm at Darlington, Wis., can be seen what happened when no lime was applied on one test plot as compared with the adjacent plot which was limed

yields were not what they might have been because of a lack of liming material.

Of the 200,000 soil samples tested last year, 50 percent were still acid and in need of liming material. True, many of these fields have been limed once, some of them twice but the tremendous demand by these lime-loving crops—alfalfa and clover—has pumped the liming material out of these soils and they have become acid and sour again. Many fields were not limed at heavy enough rates at the outset; those that were, need more now after six, eight, or ten years of cropping. The job of liming is never done.

It's necessary to re-lime at intervals of every eight to ten years. We say, maintain the pH of your soil at 6.5 to 7.0. Keep your soil just a little under the neutral point. In other words, just a trifle on the acid side. Professor Emil Truog, who developed a test for soil acidity back in 1912, and who has devoted a lifetime to a study of the relationship of soil acidity to the lime requirements of various crops says, "For alfalfa, keep your soils well supplied with lime, maintaining the pH at between 6.5 and 7.0."

No question about it, our success even with red clover during the past 15 years is due in part to a lime-rich soil. Twenty-five years ago we were all worried about clover failures and the big cry among our agricultural leaders and farmers as well, was "bring back clover." Well here in Wisconsin it's back—due in part to the more general use of commercial fertilizers, but more than anything else to the 28 million tons of liming material which we have applied to our acid soils in the past 18 years.

For best results, apply liming material on the plowed land and disc it into the soil, but where more than three tons per acre is applied, it is best to spread half before plowing and disc it into the surface 4 in.; then plow and apply the other half.

Many farmers ask the question about applying liming material as a topdressing to old established fields of alfalfa that are yellow and thinning out. We advise liming these old fields this fall or next spring. Remember, however, that agricultural limestone is only slightly water soluble so that the finer the particles, the greater the penetration and the more effective it is where applied as a top-dressing. The same is true where applied on plowed land. The effectiveness of the liming material is in proportion to the fineness of the particles, but of course there are economic limitations in this matter of fineness of grinding. Fertilizers, too, are needed on these old established fields that have produced the big crops of hay these past two years. They will need a good square meal of plant food to get them in shape for this year's hay crop.

Limestone pulverized to a fineness where 50 percent of the material will pass a 60-mesh screen is a satisfactory product. Failure to get results with agricultural limestone has been due in some instances to the coarseness of the product. Farmers should insist on a reasonable degree of fineness, and if in doubt as to the quality of the product, samples should be submitted to the Soils Department of the University of Wisconsin for both calcium carbonate equivalent and screen tests.

Our Wisconsin Agricultural Lime Law has set up the following specifications: "Grade A Agricultural Lime" designates a product of which at least 90 percent passes a standard 8-mesh sieve and either at least 50 percent passes a standard 60-mesh sieve or at least 30 percent passes a standard 100-mesh sieve. The minimum neutralizing value is 80 percent on an oven dry basis. Expressed decimally, the product of the amount passing the 8-mesh sieve multiplied by the neutralizing value must equal or exceed 0.72. "Substandard Grade Agricultural Lime" designates a product which does not meet the minimum specifications of "Standard Grade Agricultural Lime."

## Lime Holds Phosphorus in More Available Form

Agricultural limestone helps to hold phosphorus in a more available form. In fact, it will loosen up or release phosphorus from acid soils. Soil tests made on fields that were limed 6 to 10 years ago and maintained at a pH of 6.5 invariably show a higher level of available phosphorus. Where a soil is acid, the soil colloids or acid-clay particles fix and hang

onto the soil phosphorus. Also by liming, the phosphate which we apply in the form of superphosphate is kept from reverting to the more slowly available iron and aluminum phosphates. True, the liming of these soils to a pH of 6.5 reduces and slows down the rate at which the phosphorus in rock phosphate becomes available.

Let's buy and apply lime now—and we say in Wisconsin, don't stop with the liming of the cropland, rather plan to lime every acre of acid pasture land, and there are some 3,000,000 or 4,000,000 acres of permanent pasture in this state of Wisconsin that would be benefited from an application of lime.

#### **Test Soil First**

We also advise our farmers not to waste lime on land that doesn't need it. On the other hand, don't waste valuable alfalfa and clover seed on acid soils. Take samples from the fields you plan to seed down to alfalfa next spring. Have them tested not only for their lime needs but for fertilizer needs as well. Test these old alfalfa fields where the big crops you have harvested the last two or three years have pumped the lime. phosphate and potash to low levels. A fertilizer combination of 0-10-30 or 0-9-27B (boron included) applied at rates up to 300-400 lb. per acre along with additional amounts of liming material (where the soil is acid) will pay off in bigger and better crops of hay next year. "Lime for the land's sake." Yes, lime because it's a good investment. But remember that: 'Lime without manure may make both farm and farmer poor, but lime plus phosphate-potash-clover will make the old farm rich all over."

## Selling Limestone on It's Merits

By EARL E. BARNES®

THE PHENOMENAL INCREASE in the sale of limestone within recent years is probably due, at least in part, to the government payments, which have been made for the use of limestone on the land. In 1942, there was sold in Ohio about 1,250,000 tons of liming material. In 1949 the amount sold had risen to almost 2,200,000 tons. Doubtless government payments had much to do with this increase, but another factor has been the fact that farmers' incomes have been high in the past decade, and this put them in the brackets where high income taxes took a toll. The farmer reasoned that he had better spend more of this income for liming material and cut his income taxes, which he did.

Should government payments for using liming material stop, and at the same time, because of a lower price for farm products he did not need to lower his income to avoid high income taxes, it will doubtless be harder to sell agricultural limestone than for some time past. This will call for more sales effort. It is to be hoped that this sales effort will not take the form of producing an inferior product, from the standpoint of fineness, in order to offer it at a lower price. Such a course would not be to the best interest of either the farmer or the agricultural limestone producer.

At least the effects of the subsidy policy during the past few years has been to introduce many farmers to the benefits of liming, and it should not take too much effort on the part of the agricultural limestone salesman to bring these benefits to his attention, and persuade him to continue his buying. Sales resistance must be met by making soil tests and finding out where the limestone is most needed. It is as much to the interest of the salesman as the farmer

<sup>\*</sup>Agronomist, Ohio Agricultural Experiment Station, Wooster, Ohio

to put the liming material on the land which needs it most, if he expects to get further orders.

The successful agricultural limestone salesman in the years to come will be the one who offers the most service to the farmer. He will help him find out where he needs the liming material each year in order to produce the kind of crops he wants to grow. He will make limestone available at the seasons when the farmer can use it advantageously. He will either furnish spreading service himself or locate such a service for the farmer. This will entail stockpiling agricultural limestone during the seasons when the farmer is not in a position to have it spread so as to have it on hand when he needs it. True, much can be done to educate farmers to use agricultural limestone at times when he does not realize he could use it to advantage. Thus, much liming can be done during the summer and fall on old meadows, which will be plowed the following spring. The farmer must be shown that plowing down liming material for corn has been one of the most profitable places in the rotation to use it.

At the Ohio Agricultural Experiment Station a comparison of places in the rotation for applying liming material was made over a period of 22 years. These different places in the rotation were: on land which had been plowed for corn; on land which had been plowed for wheat: on new seedings after wheat harvest; in the fall on sod which will be plowed for corn the following spring, and applying it in small amounts on all the crops. Of these five places in the rotation, plowing down for corn gave the greatest average return. True, it was not much different than applying after plowing for corn or wheat, but it was a little greater and a lot more convenient. Such facts as these can be used by the salesmen to refute the farmer's argument that he does not have time. There is plenty of time between hay-making and plowing for the next season's corn, and the salesman must impress this fact on the farmer.

Up to this point we have been talking about things the salesman should be doing. Now perhaps the producer of agricultural limestone can do more than in the past, to keep his product in the public eye and let it compete more advantageously for the farmer's dollars. In the past, many producers have done effective advertising with calendars, etc. Other methods which might be tried are: Sponsorship of radio programs, news letters to a select mailing list, distribution of farm account books, and, the industry as a whole, might even find television a profitable medium for advertising.

The industry can also team up with farm organizations like the Grange and Farm Bureau to tell the story of the benefits of good liming practices. There is also the possibility of holding schools where the salesmen are instructed about the most recent findings by the Experiment Stations regarding the use of liming materials. These could be on a statewide basis, in which case, it is likely that the various colleges of agriculture would cooperate by furnishing lecturers.

On the whole it would not seem that a serious reduction in the use of agricultural limestone is inevitable, even if all government payments are stopped. Agricultural limestone will still be one of the most profitable investments the farmer can make. All it will take is to convince him of this fact.

### **Our Soils Need More Lime**

By R. L. COOK®

PARMERS ARE NOT APPLYING sufficient liming material to their soils to replace that which is currently being removed by cropping, leaching and erosion. Some soils are acid because they were developed from acid rocks. This is particularly true of certain sandy soils. Larger areas, however, are acid because the basic elements have been removed. Rain-water is actually a weak solution of carbonic acid which neutralizes the basic elements in rock and soils and eventually leaves them low in bases and high in the acid element hydrogen. As this process goes on, the pH of the soil decreases. A pH of 7.0 is neutral, one below 7.0 is acid. The desirable pH for most crops is between 7.0 and 6.5. There are several reasons why a lower pH may be harmful to acid sensitive plants. The quantity of soluble iron and aluminum in soils increases rapidly as the pH drops below 6.5. It is believed that in many strongly acid soils soluble aluminum exists in toxic concentrations, and there is little doubt that iron may become so soluble in such soils as to become injuri-

Phosphorus becomes tied up in acid soils as complex iron and aluminum \*Professor of Soil Science, Michigan State

phosphates. Thus large quantities of phosphate fertilizers may be rendered ineffective when they are mixed with acid soils. The addition of a liming material to such soils renders the native iron and aluminum compounds insoluble, so the reactions with phosphorus cannot take place. This is made more certain by the fact that at a pH of 6.5 or higher the phosphorus remains as stable phosphates of calcium and/or magnesium. The phosphate ions from such compounds are available to plants but are not liberated in such forms that they can combine with iron or aluminum-bearing ions or compounds.

The most desirable soil organisms are relatively inactive in strongly acid soils. This is especially true of those organisms which change atmospheric nitrogen to combined soil nitrogen. There are two groups of such organisms, those which work in the nodules on the roots of legumes and those which function without a host plant. The activity of both groups is slow in strongly acid soils.

The nitrate-producing organisms function most efficiently at a pH near 7.0. Many experiments have shown that lime hastens the activity of this group of bacteria. That is recognized in the instructions which are given for the manufacture of artificial ma-



Fig. 1: Say beans on Fox sandy loam soil, Michigan State College test. Note the mottled and curled leaves on the plants which did not receive liming material. This is characteristic of calcium deficiency

nure from such refuse materials as leaves, straw, or wood shavings. The decomposition of such materials is hastened by the addition of ground limestone at the time the compost pile is formed.

Plants grown on strongly acid soils may actually starve for calcium. A 3-ton crop of alfalfa may remove from the soil as much calcium as is contained in 200 lb. of limestone. It is not surprising that yields of such a crop are low on acid soils where calcium concentrations are low.

Soybeans likewise are high in content of calcium. In the accompanying illustrations may be seen the effect of liming material on strongly acid Fox sandy loam. Fig. 1 illustrates the effect of agricultural limestone on yield. A yellow mottling of the new leaves as shown in Fig. 2 is a characteristic symptom of calcium starvation. The curling of the leaves, also shown in Fig. 1, is caused by the fact that the yellowed leaves do not enlarge uniformly. Limestone furnished calcium which relieved the abnormal condition.

Acid soils are usually low in magnesium as well as calcium. Both elements are lost by leaching as soils become acid. Much evidence exists that plants require a rather definite calcium-magnesium ratio. For that reason it is wise to apply dolomitic limestone.

Many people in the world are starving. Population is increasing at a rapid rate. It is predicted that by 1970 there will be five persons in the United States where there are four today. Greater production will be needed. Sufficient production will be impossible unless yields are increased. The first step in obtaining greater yields is that of rebuilding and maintaining the lime supply of the soil in order that acid-sensitive, soil-building legumes may be grown.

## **Our Best Paying Soil Amendment**

By S. C. JONES

ORTY YEARS RESEARCH by the Kentucky Experiment Station and thousands of demonstrations conducted by extension workers in Kentucky counties, show almost unbelievable profits from the use of liming material on Kentucky soils, when supplementing other good soil manage-ment practices. These practices include the use of phosphate and other fertilizers, returning to the land farm manure and crop residues, growing grasses and clovers in mixtures for meadow and pasture, contour tillage on sloping and hill land, growing winter cover crops on all land where row crops or other summer annuals have been grown, using diversion ditches and terraces where needed, draining wet land, growing row crops as much as possible on more level land and keeping hill land in pasture and meadow crops as much as possible.

Some of the land in Kentucky is naturally supplied with sufficient phosphate and other land contains sufficient potash and lime, and some land all of these. Since some 20,000,-000 tons of liming materials and some 3,500,000 or 4,000,000 tops of fertilizers, largely phosphate, have been used on Kentucky farms in recent years it behooves all Kentucky farmers to have their soils tested in order to make the most efficient use of liming materials and fertilizers. Kentucky now has some 90 county soiltesting laboratories in operation. which makes it very convenient for farmers to avail themselves of this service. There is no other venture in which the Kentucky farmers could so profitably invest money as for soil testing except, of course, purchasing the liming material and fertilizer he finds he needs after having his soil tested. This would give him much greater returns because he should invest large sums of money in these needed materials after he finds out how much of them he needs.

Results from Kentucky experiment fields show liming material has given greater crop increases where phosphate has been supplied, along with the return of manure and crop residues. Crop increases of corn, soybean hay, wheat, and grass and clover mixtures, harvested for hay, have been greater on the more acid soils or soils with a lower pH. Liming material has given marked increases on all of these crops, particularly on hay (grass and clover mixtures).

The following table copied from a leaflet compiled by the writer several years ago, shows crop increases expressed in percentages: for liming material, used alone; phosphate, used alone; and phosphate and lime used together.

	Corn Inc.	Soy- bean Hay Inc.	Wheat Inc.	Hay Grass & Clover Inc.
Liming material alone Phosphate alone	24% 33%	26% 27%	20% 67%	59% 82%
Phosphate and liming material	60%	63%	126%	188%

Taking the phosphate alone from the phosphate and liming material together and attributing the increases to the liming material, the corn increase would be 27 percent, soybean hay 36 percent, wheat 59 percent, and grass-clover-hay 106 percent; or when used with phosphate, liming material is 3 percent more efficient on corn. 10 percent on soybean hay, 39 percent on wheat and 106 percent on grass and clover hay than when used on these crops alone.

Taking a longer period of time and including more recent results from Kentucky experiment fields, and expressing the returns from liming material in monetary values, with present prices for these crops, startling figures are revealed.

Some of these fields are now 40 years old and have been limed a number of times. A study of the records and soil tests from time to time to determine their liming needs indicate that liming material lasts a considerable time.

Under the system of soil management practiced in conducting these field tests, where loss of liming material from leaching and erosion is at a minimum, agricultural limestone

(Continued on page 200)



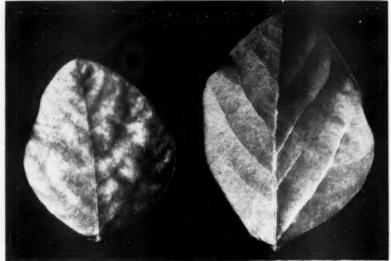


Fig. 2: Say bean leaf, left, calcium starved; right, normal leaf, Michigan State College test

## WILL FARMERS "BUY" AGRICULTURAL LIME?

A PERTINENT QUESTION in the minds of quarry owners and agricultural limestone producers at the present time seems to be, "Will farmers buy agricultural limestone on their own initiative, and out of their own pockets without having it shoved down their throats by the government?"

My personal reaction to this, and my adopted practice as a farmer, for some time has been yes. My impression as to what other farmers will do is also of an affirmative nature—if from some source, or from some particular reason, they personally develop an internal inspiration to get efficient production from their soil. And if they get clearly established in their own minds a rather detailed and motivating conception of what agricultural limestone actually does to help them accomplish their crop production objectives.

During the past few years I have had a rather close and very pleasant relationship with the agricultural limestone industry in general. Therefore at this time I feel free to comment in a frank and thought-provok-

ing manner. True, it is, that government appropriations and government programs handled through such agencies as A.A.A., S.C.S., P.M.A., etc., have been noble in their original intent, and they have gone a long way toward making farmers conscious of the fact that there exists such a thing as agricultural limestone, Unquestionably, these mediums have been responsible for the fact that millions of tons of liming material has been applied. However, these appropriations and these programs, seem to have done comparatively little to demonstrate the proper use of agricultural limestone or to establish in the minds of farmers a lasting impression as to the important and essential part that it plays in soil fertility management and efficient crop production.

By and large, it seems that up until the present time, farmers have been subsidized into accepting agricultural limestone and quarry operators have been bribed into making it available—without the producers in general having a clear concept of their responsibility in producing and delivering the material and without the farmers in general having a constructive comprehension as to their objective in the use of the agricultural limestone delivered to them.

Some of the fallacies of such a continuous-subsidy program are now being clearly demonstrated by the fact that there exists general concern throughout the limestone industry, over what will happen to the existing tonnage-movement of agri-

By R. WILLIS STOUT

cultural limestone if government appropriations to existing programs should be greatly reduced or completely cut off. They are admitting fear

• AGRICULTURAL LIMESTONE PRODUCERS should be very much interested in the straightforward, thought-provoking suggestions by R. Willis Stout, farmer and soil editor of The Kentucky Farmer, and a confirmed user of liming materials going back to the early thirties. He makes some challenging charges against present practices and thinking of agstone producers, and believes that the farmer can be sold on the advantages of buying liming materials if he is educated with the right promotional material and sales approach.-THE EDI-

that without government financial aid by and large farmers would just quit using agricultural limestone. A feeling of insecurity is one of the things that has to be tolerated while riding on an unreliable horse.

#### Now Use Wrong Sales Approach

Twenty years of such program administration without making an impression that can be trusted as strong enough to bear the program on its own merits, makes one wonder about the effectiveness of such an approach.

It might be well for us to stop a moment and consider the general impression that has been created in the average farmer's mind during the past 20 years, with regard to the necessity in his farm operation of things like fertilizer, hybrid seed corn, and modern farm machinery—as compared to the impression that he carries concerning the essentiality of agricultural limestone. Yet, its proper use is a factor just as important in obtaining maximum efficient production from the soil.

The agricultural limestone industry as a whole devotes a lot of time and effort toward the encouragement of large "government program" appropriations and lenient material specifications. As a whole, the industry seems to have been doing comparatively little to directly impress and better serve individual farmers, who are the ultimate consumers of their product, and the ones who really control agricultural limestone's outlet value.

Personally, as a farmer, I was instructed in the advantages and essentiality of agricultural limestone by a fertilizer salesman. I have become a confirmed and consistent user of this material because of the understanding I have, as to the contribution it makes toward helping me attain my production objective. As a farmer, I have never had the pleasure or good fortune of being approached by an agricultural limestone sales representative.

#### Sell A Complete Program

A tried and proven sales approach that has worked especially well in the agricultural field is that in order to sell a product, you advocate and help promote a complete program of efficient production and accomplishment. Such a "program" may be based on the production of cash crops, or pasture and livestock or both. The creation of a substantial demand for the particular product that you are offering for sale, becomes incidental as an essential medium of accomplishment in the "program." Such an approach not only automatically creates a demand for your product, but it encourages the potential customer to employ methods of operation that are economically stable, thereby increasing his desire to buy and ability to pay for the things he needs and wants

The fertilizer salesman that in structed me as to the proper use of agricultural limestone, spent a lot more time selling a complete program of "soil fertility management" and "crop production challenge" than he did talking about fertilizer. Now, as I look back, I suspect that his reasoning must have been something like this-that a kindled desire to accomplish, along with the proper use of agricultural limestone, the incorporation of organic matter and good soil management, would enable me to get maximum results from the fertilizer he was selling. And that the resulting increased crop production would both inspire and enable me to expand my use of the program and his fertilizer

#### Suggest Use of Movies

There are movies galore depicting the manufacture, application, and results of commercial fertilizers, and glamorizing the use and accomplishments of modern farm equipment. I have never seen a movie glamorizing the origin, purpose and use of agricultural limestone.

To sum up the foregoing observations: Just because the government helps to introduce a much-needed product, it is no indication that it can be, or should be, relied upon indefinitely to promote the sales and use of that product. When you have a good product, that is essential to efficient accomplishment, it is not a good idea to depend on some outside sales

Continued on page 1941

# JET PIERCING BLAST HOLES In Granite

Consolidated Quarries Corp., Lithonia, Ga., reduces costs and speeds up operations by sinking blast holes with churn drill equipped for jet piercing

By J. R. THOENEN® and G. D. GERMAIN®

PHE TERM "FUSION PIERCING" Was applied in early years to a method of producing blast holes because it was thought necessary to use a flux along with the fuel in order to actually smelt the hole into the rock. This term has now been replaced by "jet piercing."

The first experiments in jet piercing were conducted over 14 years ago in the underground operations at the Soudan mine of the Oliver Iron Mining Co., in Minnesota. The results showed promise, and field tests were made on the surface at the property



Cracks show back break condition

Churn drill which was converted for jet piercing

of the Reserve Mining Co. at Babbitt, Minn., in 1941. These tests showed that blast holes could be made in the hard taconite or low-grade iron-bearing rock by means of a flame and proper fluxing agents. Shortly after these tests, the experimental work was deferred due to the war. Tests were resumed at Babbitt in 1946. In the tests of 1947, a blowpipe of radically new design was introduced which made it possible to eliminate fluxes.

Experimental work with jet piercing is now being done by the Consolidated Quarries Corp., Lithonia. Ga. Jet piercing is still in its infancy; and, while it shows considerable promise, further operating experience will undoubtedly lead to more efficient operations.

#### **Quarry Characteristics**

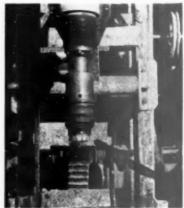
The Consolidated Quarries Corp. plant and quarry are 3 miles northeast of Lithonia, Ga., on a great outcrop of rock known as Rock Chapel Mountain, comprising about 115 acres. Normally, the plant furnishes about 1,000,000 tons of rock products annually to the construction industry.

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The writers appreciate the cooperation and
assistance of Nelson Severinghaus, vice-president and general manager, Consolidated Quarries Corp., Lithonia, Ga., and his staff, and
the development engineers of Linde Oxygen Co.

The quarry rock is a hard, firm, close-textured, fine-grained biotite granite-gneiss. It is highly contorted and usually thin banded, the black biotite and light-color feldspars and quartz being more or less differentiated into layers. The biotite occurs somewhat regularly distributed through the feldspar and quartz areas and also as distinct thin bands. Large and small grains of magnetite are found. Tourmaline occurs commonly in pegmatitic veins. The rock mass is cut by a well-defined set of slickensided joint planes, grooved and striated, giving evidence of movement.



Close-up of burner with arrow pointing to flame end

Quartz and feldspar make up the greater bulk of the rock. The quartz occurs as variable-size, irregularly bounded grains. The feldspar constituent consists of nearly equal proportions of the potash species, orthoclase and microcline, with a fair sprinkling of plagioclase. The proportion of orthoclase to microcline varies. Other minerals present include muscovite, epidote, occasional garnet, magnetite and prismatic inclusions of apatite and zircon.

The following analysis of a sample of minus-10-mesh screenings represents a quarry face 900 ft. long and 90 ft. high.

1	Percent	Percen		
Silica, SiO <sub>2</sub>		Magnesia, MgO		
Alumina, Al <sub>2</sub> 0 Ferric oxide,	h 14.14	Potash, KaO: Soda, NasO	3.10	
Fe <sub>2</sub> O <sub>3</sub>	2.30	Loss ignition	0.54	
Lime, CaO	1.44	Total	99.57	

The physical properties of the rock are:

Percent wear	3.2
Hardness	18.3
Toughness	13.0
Wt. per cu. ft.	164.0 lbs.
Crushing strength, lbs. per sq. i	

#### **Jet-Piercing Equipment**

A standard Bucyrus-Erie N27T churn drill was converted for the jet-piercing tests. A platform was provided on which the process controls for oxygen, fuel and water were located in such a position as to enable the operator to maintain complete control of lighting the burner, shutting down, and drilling. The fuel pump, water pump, and oxygen-regulating apparatus were mounted on the drill rig. The spudding action of the churn drill was changed to provide a 4-in. oscillatory stroke to the blowpipe instead of the 12-, 18-, 24- or 36-in. stroke normally used when churn drilling. A 34-in., 6 by 19 plow steel, left-lay cable is used, as it was believed that the power on the main hoist was large enough to snap a smaller cable should the blowpipe become jammed in the hole.

An auxiliary sheave or narrow reel was located on the mast about 15 ft. below the top sheave. This facilitated handling the oxygen, fuel and water hoses in and out of the hole and prevented their looping. The hoses are attached at five intervals to the drill cable by means of toggle wrenches.

An adequate supply of water is important, as it keeps the combustion chamber of the copper burner from being consumed by its own heat. It also forms steam along with the combustion gases to eject continuously the spalled material from the hole. A water pump and small tank are provided at the drill rig to furnish water from the main water line at a pressure of 60 p.s.i. An electric light on the control board warns the operator of any water failure, so that the oxygen and fuel can be cut off.

An exhaust fan is installed at the front of the drill rig to remove the steam and exhaust gases from the



Drill equipped for jet piercing showing method of deflecting steam after exhaust system had been installed

vicinity of the operator. The suction side of this fan is provided with a screen to prevent the entrance of large rocks. The fan housing has a drain at the bottom to remove condensed water as well as fine rock particles.

The liquid-oxygen supply is delivered to the Linde Cascade storage unit by means of a truck. The present storage unit has a capacity of 40,000 cu. ft., or approximately four hours burning time. This capacity is too small for regular, efficient operations and will be increased to 120,000 cu. ft. This will eliminate many delays experienced during the experimental work. Oxygen is under a pressure of 2300 to 2400 p.s.i. at the storage unit and is reduced to the gaseous state for use in drilling at 150 p.s.i.

Water and oxygen are delivered to the drill through 2-in. standard pipelines and 11/2-in. hose. Permanent oxygen pipe will be laid some 200 to 250 ft. parallel to the series of rows to be drilled. These pipelines are to be laid with tees equipped with valves and plugs at 200-ft. intervals. Rollergrip couplings will be used at 80-ft. intervals. Tees will be brazed to the pipe, and all threads are to be tinned to prevent leakage. Valves are to be provided with a special Ollmer type of packing. The oxygen lines are washed out with caustic soda before being used. The fuel or kerosene supply presents no problem, as the fuel is delivered by truck to a small, skidmounted tank near the drill rig. The fuel pump on the drill rig takes its supply from this tank, which is moved or skidded to each drill site.

The blowpipe consists of a long, seamless, steel tube, at the bottom of which are attached the burner and hole sizer or reamer. Oxygen, kerosene, and water hoses are attached to the upper end of the steel tube. Oxygen and kerosene are carried to the burner through separate tubes inside the larger tube, and water is carried to the burner in the remaining space.

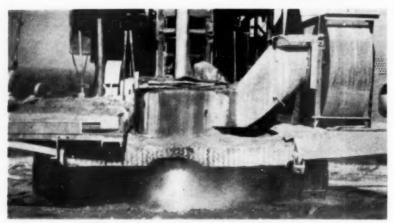
The burner is a single-orifice, high-velocity type, consisting of an atom-

izer section, a combustion section, and a face cap. The kerosene and oxygen are atomized, admixed and burned under pressure in the combustion chamber. The hot burning gases are ejected at supersonic speed (velocity of gases has been determined to be 6,000 f.p.s.) from an orifice in the face cap. Water is emitted on the periphery of the blowpipe in a series of jets at a point just above the atomizer section.

The burner operates at a flow of 10,000 cu. ft. of oxygen, 40 gal. of kerosene, and 800 gal. of water per hour, respectively. The life of the burner itself depends on the arrangement of the cooling system along with a sufficient flow of water at 60 p.s.i. The burner is constructed from special oxygen-free bar copper with the face cap, combustion, and atom-



Showing cloud of steam before exhaust system was installed



Close-up of jet flame projecting downward from drill rig

izer sections silver-soldered together. The present type of burner used in the tests is commercially feasible, but future operations may dictate an alternate burner design and possibly use of a rotating, multiple-jet type burner.

Various hole sizers or reamers have been tested, and no definite conclusions could be drawn as to the best type. Hole sizers 5½ in. in diameter used in the burning or initial pass were of the 3-, 4-, and 6-in. prong and saucerlike types. The hole sizer, 6½ in. in diameter, used in the reaming or second pass had four tapering ribs which were securely welded outside the shell.

Maintenance problems are not difficult or excessive. The face cap of the burner which is exposed to the sand-blasting action of the cuttings is easily replaceable, as it is silver-soldered to the burner. Current indications are that the face cap must be replaced after 20 to 25 hours of piercing. The life of the balance of the burner is estimated as approximately 300 burning hours. The hole sizers are built up locally to size by welding a hard facing material on the prongs or ribs. As certain abrasive solids pass through the exhaust fan some wear will occur,

but as this installation is comparatively new, nothing is known of the life of the fan and ducts.

#### Size of Holes

The first three holes jet-pierced had a minimum diameter of 5½ in., which was governed by the buildup on the hole sizer on the front end of the blowpipe. Standard blasting practices at Consolidated Quarries required that the holes be enlarged to accomodate 6-in. Nitramon cans. This was accomplished by a reaming pass after initial piercing of the 5½-in. hole, for which a hole sizer of 6½-in. diameter was mounted on the front end of the blowpipe. All of the remaining holes drilled were given the reaming or enlarging pass.

Although the minimum diameter of the hole, as controlled by the diameter of the blowpipe, is about 5½ in. volumetric measurements indicate that the average diameter of the holes made in the single initial pass is 8½ in. The shape of the holes resembled a string of cones, with the larger end up and the smaller end down.

Walls of the jet-pierced hole tend to be convoluted rather than smooth. However, they are not rough enough to injure the Primacord. In a few holes, some large cavities were found which were probably caused by holding the flame too long in one spot when the burner was stuck. The jetpierced holes are plumb when the drill rig is properly leveled.

A feature of jet piercing is the easy ability to expand the bore to chambers at any desired point, thereby increasing the explosive capacity of the blast hole. However, standard blasting practice at Consolidated Quarries does not utilize this procedure.

The ultimate depth of holes that can be pierced remains unknown. The second hole was pierced to a depth of 116 ft. and there was no indication that this was the limit as cuttings were blown from the hole 20 to 25 ft. into the air.

Jet-pierced holes may be cut in the exact location and spacing required for best breakage regardless of backbreak conditions existing at the required hole location. Holes were made at spots where it would have been virtually impossible to put down a churn-drill hole.

The holes are spaced 34 ft. apart and 18 ft. back from the quarry face. Although two rows of holes will be drilled, only the first row will be shot. This spacing of holes and burden gives approximately 50 tons per foot of hole depth.

#### Operating Results of Experiments

The first hole was completed on March 14, 1952, and 50 holes had been drilled by October 16. During this period, there were delays due to alterations of the drill rig, lack of oxygen and lack of experience.

Holes varied from a depth of 15 ft. for hole No. 1 to 116 ft. for hole



View of guide shell



Showing face of granite quarry in which jet piercing experiments have been made

No. 2. Most holes varied between 84 and 108 ft. in depth.

The time in minutes is recorded for the intervals from lighting the burner to shutting it off for both the first pass and the reaming operation. Table 1 shows the piercing time and rate of piercing in feet per hour. As more operating experience was gained, the average piercing rate, in feet per hour, improved.

Table 2 shows the average oxygen, in cu. ft., and kerosene, in pounds, consumed per foot of hole. Detailed records were kept for the first 15 holes as a check. The burner uses approximately 10,000 cu. ft. of oxygen and 270 lb. of kerosene per hour of burning time.

Some sections of holes were pierced at rates of 42 f.p.h. but the average rate is expected to be 30 f.p.h. The operating crew was recruited from a churn-drill crew and is constantly improving as experience is gained.

#### **Estimated Costs**

Formerly drilling was done with churn and wagon drills, the latter accounting for one-third the total drilling. The Consolidated Quarries Corp. does not segregate churn and wagon drilling costs. The average footage drilled during the past year, including delays, for churn drills was 1.6 f.p.h. It is expected that, in the future, 10 f.p.h. can be maintained by jet piercing.

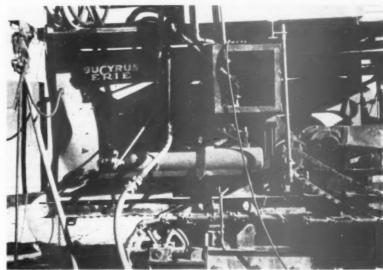
The following Table 3 shows preliminary estimates of the cost of jet piercing:

Table 3.—Preliminary estimates of cost of

jet piercing				
Item	Per foot of hole			
Oxygen Fuel oil License fee Water pumping Drill repairs Labor	\$1.77 .20 .19 .01 .10 .25			
Total direct cost	82.52			

During 1951 primary drilling cost was 6.8 cents per ton for churn and wagon drilling. Using the above estimated costs per foot of hole, the costs per ton are expected to be lowered to approximately 5 cents.

On May 20, 1952, the first eight jet-pierced holes were shot. There were some large cavities in three of the eight holes, and the Nitramon cans



Water pump and piping apparatus on drill rig

piled up in two of the holes, which gave concentrated explosive loads at those points. This necessitated deckloading and eliminated bottom-priming. Water was added to the remaining six holes to overcome voids around the cans. No water was added to the deck-loaded holes, which were timed to fire together. All other holes were connected with Primacord millisecond connectors. The top primers were timed to allow the bottom primers to fire first.

All holes in this blast fired with good results, except in front of the deck-loaded holes. The difference may have been due to elimination of bottom priming and the concentrated explosive loads.

Fragmentation has been improved slightly in blasting jet-pierced holes. This is due chiefly to more accurate spacing of the holes than in churn drilling.

Standard blasting practice calls for loading holes with Nitramon cans to within 12 ft. of the collar and using stemming. The hole spacing, as mentioned before, gives about 50 tons of rock per foot of hole depth, and about three tons of rock are broken per pound of explosive.

#### Welding Handbook

THE LINCOLN ELECTRIC Co., Cleveland, Ohio, has announced the publication of a 143-page book on "Weldability of Metals." Topics covered include Characteristics Affecting Weldability; Tests for Checking Weldability; Choice of Steels for Best Weldability; Effect of Common Elements on Weldability; Effect of Heat on Weld Metal and Base Metal; A. W. S. Specifications for Mild Steel and Low Alloy Electrodes; Welding Procedures; A. W. S. Specifications for Corrosion Resisting Electrodes; Welding High Manganese Steels; Welding of Aluminum Alloys; Welding Copper and Copper Alloys; Welding of Nickel and Nickel Alloys; Welding of Clad Steels, Forgings, Cast Steel, Cast Iron, Wrought Iron, Ingot Iron, Galvanized Steel, Terne Plate and Enamelling Stock; and Arc Weld Surfacing.

The book is a direct reprint of Chapter II from the "Procedure Handbook of Arc Welding Design and Practice," a 1200-page volume now in its ninth edition. Price of the smaller edition is \$0.50; of the full edition, \$2.00 (\$2.50 outside U.S.A.). They may be ordered from any dealer or representative of the company, or direct from The Lincoln Electric Co., Cleveland 17, Ohio.

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#### Limestone for A-Plant

BLUE ROCK, INC., Washington Court House, Ohio, is shipping approximately 35 to 50 carloads of crushed limestone per day for construction work at the Piketon, Ohio, atomic energy plant. It is reported that the amount of crushed limestone supplied by Blue Rock for the atomic plant will be increased considerably in the near future, which will necessitate the installation of additional equipment.

Table 1.-Piercing time and rate

	Total	Piercing time, in minutes			Piercing rate, ft. per hr.		
Hole numbers	depth,	1st pass	Reaming	Total	1st pass	Reaming pass	Composite
1-3 4-5 27-40 40-50 50-82 Totals	237 1189 1400.5 983 3133 6705.5	2366 2709 1817 7225	268 256 181 667	598 2634 2965 1998 7892 16087	30,15 31.0 32.4 26.0	266.2 328.2 326.0 282.0	23.8 27.1 28.0 29.5 23.8 25.0

Table 2.—Average oxygen and fuel consumption per foot of hole

	Oxygen consumption, cu. ft.			Fuel consumption, in lb.—in gals.			
Hole numbers	1st pass	Reaming 1:ass	Ave. Total	1st pass	Reaming	Ave. Total	
1-3 4-15 Average	331,9	37.7	421 369.6 378	9.0	1.0	11,3 10.0 10.2	1.48

## Iowa Agstone Producers to Promote More Direct Sales

RECORD ATTENDANCE was attracted to the eighth annual convention of the Iowa Agricultural Limestone Association in Des Moines on March 4 and 5. It was a well-rounded program of business sessions and entertainment. The first day was devoted to a directors' meeting, committee meetings, registration, and a reception sponsored by the associate members in the evening.

President Floyd H. Millen presided at the first general meeting session on Thursday morning which was opened with the showing of a moving picture, "A Day In Court," presented through the courtesy of International Harvester Co. The picture stressed the importance of patience, courtesy and observance of traffic laws to cut down accidents.

Clint A. Allen, executive secretarytreasurer, reported that 11 new members had been added since the last annual meeting and that the membership now comprised 90 producer members and 37 associates. He mentioned that percentage depletion legislation had resulted in a substantial reduction in federal taxes. Mr. Allen said that the association was in the third year of its billboard advertising program. Five states are now using them. In closing, Mr. Allen cautioned the membership to "put its own house in order" by promoting more direct sales of agricultural limestone to farmers. He also urged the members to oppose a bill before the Iowa legislature which would place agricultural limestone producers under the mining division.

C. M. Kirtley presented the report of the resolutions committee which thanked the associate members for the entertainment, the management and employes of the Savery Hotel for their co-operation, and congratulated K. K. Kinsey, a member who was honored by election as president of the N.A.L.I. Robert H. Schneckloth presented the report of the auditing committee.

#### **Election of Officers**

Officers elected for 1953 were: president, E. H. Matthias, Waterloo Dredging Co., Waterloo, Iowa; and vice-president, Melvin E. Raid, Raid Bros. Construction Co., Denmark, Iowa. Newly elected directors are: J. F. Pavlovec, Calmar; K. R. Far-



Agricultural Limestone Institute, left, and retiring president of the lowa Agricultural Limestone Association, Flayd M. Millen

quhar, Cedar Rapids; and Ray A. Potthoff, North Des Moines.

K. K. Kinsey, president of the National Agricultural Limestone Institute, briefly reviewed the activities of the national association annual convention and gave a resume of the negotiations which led up to the merger of the Agricultural Limestone Institute of the N.C.S.A. and the National Agricultural Limestone Asso-



Clint A. Allen, genial secretary-treasurer of the association, standing with his efficient helpers, Mrs. Allen and Mrs. Hopper



To the left, E. H. Matthias, Waterloo Dredging Ce., Waterloo, Iowa, newly elected president of the Iowa Agricultural Limestone Association; and to the right, Melvin E. Raid, Raid Bros. Construction Co., Denmark, Iowa, vicepresident of the association

ciation. He urged everyone to attend the next annual convention of the association which will be held in Chicago in February, 1954.

#### A.C.P. Appropriation Prospects

Robert Koch, executive secretary of the National Agricultural Limestone Institute, brought up to date the latest national legislative developments. He said that the Iowa association was the largest state group in point of membership and attendance at the convention. Mr. Koch stressed the importance of congressional hearings in Washington. He said that the ACP program had been very influential in increasing agricultural limestone production to 30 million tons. He was confident that money would be appropriated to carry through the 1953 program, but the big question was the 1954 program. Secretary of Agriculture Benson has expressed the view that the farmer should very largely undertake his own conservation program using his own funds. Mr. Koch pointed out, however, that the farmer will not adequately meet the conservation requirements with his own

Mr. Koch said that it is not enough to obtain the appropriation. Those who administer the program may allocate funds previously devoted to agricultural limestone to other purposes, such as building dams, drainage, etc. Referring to state organization under the ACP program, he said that county committees could not be changed but the state committees could be changed. Mr. Koch expressed the view that very likely the Soil Conservation section will take over the Agricultural Conservation Program. He called attention to a survey made in Iowa which showed overwhelming support of farmers to the present ACP set-up. Continuance of the program, however, depends on support from the grass roots-the farmers themselves. He suggested that the Iowa producers contact farmers to have them write their congressmen urging support of the ACP program. Mr. Koch believed that the 1953 appropriation for ACP would not go below \$225,000,000.

#### **Luncheon Program**

At the luncheon, President Millen introduced the guests of the convention, including Governor William S. Beardsley of Iowa and Mayor Allan W. Denny, of Des Moines, who welcomed the convention to the city. Garvin C. Matthiesen, recipient of the association's agronomist student scholarship at Iowa State University was introduced at the luncheon and expressed his thanks for the honor extended to him. Tom Collins, banker of Kansas City, the luncheon speaker, gave a very humorous address but packed with some very pertinent thoughts on the value of better employe and public relations.

Vice-president Ernie H. Matthias presided at the Thursday afternoon session, introducing William B. Mooney, attorney and former member of the F.B.I., who spoke on "Communism in America." The speaker was obtained through the courtesy of Vern Schield of the Schield Soft Lime Quarry, Waverly, Iowa. Mr. Mooney reviewed communism from its origin in Europe and traced its growth in the United States and steps which have been taken to reveal its activities.

#### Percentage Depletion

Horace Krause, president of the National Crushed Stone Association and chairman of the percentage depletion committee for the N.A.L.I., sketched the early attempts which were made to obtain percentage depletion allowances, starting with the work of a group of chemical limestone producers, that eventually led to the passage of the 1951 legislation. One of the biggest problems for the producer was to determine what percentage depletion allowance to use: 5, 10, or 15 percent. Mr. Krause warned that a bill has been introduced to cut down present depletion allowances. He said that some producers have not fully complied with the regulations. A producer must show evidence of ownership, lease or royalty agreement and a return must be made on each property. Cost depletion, he said, could only be taken on a property showing a loss. In some cases, he said, there is an advantage in making separate returns for each property. Most stone producers could not take advantage of "discovery' depletion. Both the N.A.L.I. and N.C.S.A. have protested against pres ent regulations as being too rigid and difficult of application, and legal counsel has been engaged to represent the industry before congressional hear-

Considerable discussion developed from Mr. Krause's talk. On the question of the definition of a separate property, Mr. Krause said that if stone from more than one quarry is transported to a common processing point it is considered a single operation. The end-use theory is now being followed for determination of the

amount of percentage depletion although the law makes no specific reference to it. It was suggested that those who take the full 15 percent depletion should set up a reserve in government bonds to cover the difference in case the full allowance was overruled although most of those present indicated that they were taking 15 percent.

Robert Burlingame, executive secretary of the Iowa Employers Association, in his talk on, "Iowa Business—Forward or Backward," commented on the possibilities involved in the death of Stalin loosening the shackles of Russia on the satellite countries. He brought in a note of caution by pointing out that many economists believe the present inflationary trend cannot continue and that we are due for an adjustment.



Roy Potthoff, left, newly elected director of the association, and W. D. Hamilton, both of Kaser Construction Co.

He said that the A.F. of L. and C.I.O. labor union philosophy that plenty of money in circulation will assure prosperity will not work against the law of supply and demand. If the demand for commodities, homes or machinery should become satisfied, a decline in any of these important segments of our economy would affect all of us. Mr. Burlingame discussed the danger of amending the Taft-Hartley law to such an extent that it would essentially be nothing but the old Wagner act. He suggested amendments to the Taft-Hartley law that would make it unlawful to have nation-wide bargaining, that would outlaw compulsory union membership, and that would place industrial labor organizations within the purview of the antitrust law. Turning to the Iowa legislative session, he referred to one bill which would adjust workmen's compensation payments on the basis of the number of children in the family.

#### **Obstacles to Conservation**

Dewey Cornell, program director of the State P.M.A. committee in Iowa, in talking about "Obstacles to Conservation" said that a recent directive had been received from Washington which would allocate funds for agricultural limestone, phosphate and green manure to 50 percent of the total. The allocation for these three practices in Iowa would be \$4,491,000 or 55 percent; the former allocation was 70 percent.



J. F. Pavlovec and K. R. Farguhar, newly elected directors of the association

Mr. Cornell outlined some of the more important reasons why farmers would not spend their own funds for agricultural limestone. In Iowa, he said, about a third of the land owners are women who are not informed about the conservation program. Price changes of the farmers' products affect the attitude toward conservation. A change in farming practices from grain raising to livestock influences thinking about conservation. Rental arrangements, particularly with out-of-state owners, are an obstacle. Fixed costs and the amount of capital investment in a farm may affect buying of agstone. Short expectancy of the tenant farmer is an important factor governing the buying of agricultural limestone. Mr. Cornell, in his closing remarks, drew a comparison with an annual expenditure of \$250,000,000 for agstone and other soil conservation minerals and the spending of nearly 42 billion dollars annually for armament.

The convention activities closed with a reception in the evening followed by a buffet dinner and ball.

#### **Bentonite Production**

Bentonite production reached an all-time high in 1951, according to a Bureau of Mines report, which listed a 25 percent tonnage increase and a 52 percent value increase, compared with 1950 figures. The foundry and petroleum industries consumed 94 percent of the total production, with the remaining going into a wide variety of uses.

Bentonite, sold or used by producers in the United States, from 1949 through 1951, was listed as follows:

Year	Short tons	Value
1949	867,243	\$ 6,938,752
1950	973,883	8,560,669
1951	1,218,868	13:006,645

#### **Phosphate Plant**

SWIFT & Co., Fertilizer Div., Agricola, Fla., is planning construction of a \$25,000,000 triple superphosphate and uranium recovery plant, north of Lakeland, Fla. Construction of the plant will add another major industry to the growing phosphate mining in the Lakeland area and tie into the program of using phosphate by-products to procure radioactive materials.

## Theory and Practice of

## LIME MANUFACTURE

Part III. Rates of heat absorption in calcining limestone particles of various shapes and sizes

By VICTOR J. AZBE"

THE IDEA HAS PREVAILED that the lineal rate of advancement of the phase boundary, the lime-stone junction, through a particle of limestone being calcined was constant for any given external temperature and heat transmittance condition. In accordance with this theory the calcining rate would be in direct proportion to the diminishing calcining surface of the remaining core.

This is presented by curve A of Fig. 11, plotted with time, and also relative calcining depth against percentage of calcining completion. While calcination of a 2-in. cube starts with 24 sq. in. of surface at this relative rate, at 1-in. core the surface will be only 6 sq. in. and the calcining rate only one-fourth the initial rate. Fifty percent of the limestone would be calcined in 21 percent of time and the last 12.5 percent require half of the total time.

Curve B is based on actual tests in which limestone was being weighed while calcining, and the furnace was maintained at constant temperature conditions. For the test, both a cube of 1- x 1- x 1-in. size and also small oblong slabs of 1- x 2- x 3-in. size were used. The results for cubes and slabs were so close that one curve applies to both. Not considering the small deflection at the inception of calcination caused by slight calcination retardation, due to some terminal preheating, we may say that the curves A and B are superimposed and that the calcining boundary progression is constant, but this only until half of the lime is calcined.

Thereafter a gradual change occurs and the curves part. At 50 percent of total time only 80 percent was calcined and for the last 5 percent of required calcination, 20 percent of the total time was required.

This is not a simple matter, and further on it is discussed as a very serious matter because competitive quality of lime depends on the last few percent of CaO availability. In the case of curve B, for the first 40 percent of calcination and for the last 5 percent in each case 20 percent of the total time was required.

Curve C is the result of a suspension test which was conducted under conditions of rising furnace temperature, aiming to duplicate the ever

higher temperatures that the stone and lime are subjected to in the kiln.

Calcination started at 1350 deg. F. At first it was slow, partly due to terminal preheating and partly to the low temperature prevailing. Subsequently the rate was higher, and for a 40 percent portion of time it was constant. That is, the reduction in calcining surface was offset by the raise in temperature, the effect of one being canceled by that of the other.

At 75 percent completeness of calcination, the rate started reducing, even though the temperature was rising more rapidly. The calcining surface became too limited and at the end, although temperature up to 2100 deg. F. prevailed, 20 percent of the total time was required for but 6 percent of calcination.

#### The Interfacial Region

The various factors governing the time of calcination, those of surface and calcining depth, of temperature and heat transmittance, are fairly well known, as are those of calcining temperature and heat requirement. However there is one factor that may be broken up into several, which does not seem to be realized at all.

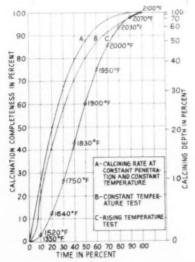


Fig. 11: Rate of penetration of zone of calcination and amount calcined

Whether calcining time will be either short or long depends of course on the rate of heat supply, which in turn depends to an extent on heat receptivity and this beyond just the matter of conductivity. There is an additional factor involved, which does not seem to be appreciated at all. It is the state of affairs within the "Interfacial Region" wherein the reaction occurs.

To one side of this region is the inward progressing lime wall, to the other side the retreating stone wall. Between the two is a boundary of varied stone surface projections, varied CO<sub>2</sub> tension and varied temperature which all combined affect the time of calcination.

Regardless of temperature, the reaction can occur only where CO<sub>2</sub> can escape, that is, only at the surface of the stone. It cannot occur internally in the stone, even if a high temperature prevailed, since the correspondingly high equilibrium CO<sub>2</sub> pressure would prevent the reaction from taking place.

Thus there are two surfaces to each piece of lime. There is the external "heat absorbing surface" and there is the "internal calcining surface." But there is a difference. A freely exposed 2-in. cube of lime would have 24 sq. in. of heat-gathering surface. If this lime had a 1-in. core, the supposition would be that the calcining surface is 6 sq. in. However, this is not necessarily so. While externally the gross surface counts, internally all the corrugations of the eroding stone face and all the surfaces of the cervices to which the fissures and veins capable of passing CO lead, constitute the actual calcining surface.

A sound calcite crystal will present a smooth wall, with the least surface, and will be the slowest calcining. A fossiliferous limestone on the other hand will present far more surface, if not calcite impregnated, and will calcine faster. Thus the "interfacial region" may be knife edge sharp or a wide band, exemplified by some cores being sound stone from which lime breaks off cleanly while others are lime permeated to the extent that they hydrate and almost

\*President, Azbe Corporation, St. Louis, Mo.

completely disintegrate while on the dump.

Through the interfacial region there are thus lime and a varied amount of calcination-resisting residuals, which resist for reasons of density and minimum of surface area, and require either a higher temperature or a longer time.

One would be inclined to state that limestone would calcine as fast as it would receive the heat, and in a manner this is true. But it will calcine no faster than the CO<sub>2</sub> can escape and no faster than the available carbonate surface can accept the heat, which is governed by the temperature prevailing at this interface surface.

We could say that calcination time is not the direct factor of furnace temperature, or even of the outer-surface lime temperature. The primary factor is rather the required temperature at the phase or interface boundary, in respect to the CO tension and calcining surface available.

Referring to both Figs. 5 and 6 (February and March issues), representing two groups of tests, each rise in calcination rate increased the center temperature, and stone temperatures as high as 2000 deg. F. were noted in other such laboratory sized samples.

Limestone temperature varies with the calcining rate. As to how much this is a matter of calcining-surfaceheat transfer and how much that of increased CO<sub>2</sub> tension we do not know. As to the latter there must be a back pressure created by the escaping CO<sub>2</sub> at high rates of calcination and that may be more than we imagine within the specific unit cells of the dissociating carbonate, and each rise in pressare increases the required temperatures.

But whether the required rise of temperature is for reasons of heat impartation, or for vising of CO<sub>2</sub> tension, it does demand a corresponding rise in lime surface temperature to maintain the heat flow potential. At the high rates this is sufficient to affect the quality of the surface lime and also affect the kiln efficiency. Also at the very highest of rates this would tend to make the reaction self limiting.

#### Temperature Effect on Quality

This subject will be dealt with more completely in a special paper. It is treated here merely in as far as it bears on the current series of tests, primarily to avoid faulty conclusions in respect to the desired calcining temperatures.

While in some cases a hard-burned lime is desired, and hard burning proves of no disadvantage in the process for which lime is used, in general what is considered a good lime is soft burned, but still completely burned so that the oxide in such lime will be more fully and freely available. For the best lime a good stone is demanded, and such a stone will stand a higher calcining temperature without impairment, but a poor quality stone may still give a fair lime if soft burned.

It is a matter of temperature and time of retention at the respective temperatures as well as of stone quality. The latter goes far beyond what the chemical analysis may reveal, since much depends on the distribution of the extraneous components and their combination and tendency to form eutectic compounds.

If these are present in readily reacting form and minutely dispersed as in hydraulic lime, then their combination with calcium oxide will occur almost as soon as the CaO is released from the carbonate state. No degree of soft burning can prevent it. Low temperatures in such a case will only prevent formation of silicates of higher CaO content, of fluxing, sintering and consolidations.

If the extraneous matter, however, is present in somewhat coarser aggregations, lower temperatures may greatly minimize their combinations with the calcium oxide. In some cases these inter-reactions may be almost completely avoided, with virtually all of the calcium oxide remaining free and available. Where such is the case and hydration is practiced most of the impurities are thrown out.

Lime also, that is, any lime, has a pre-disposition in a varied degree, to shrink and become increasingly denser at higher temperatures and increased time of heat exposure. As such it then presents a lower surface area, lesser reactivity, coarser particle size, lower surface water retention and with this a lower plasticity.

We could say that over-burned lime

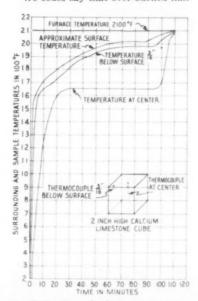


Fig. 13: Heating and calcining rate variation through a body of stone

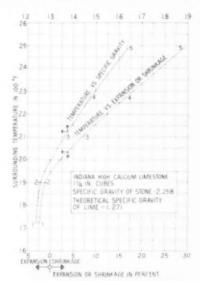


Fig. 12: Effect of temperature on expansion and shrinkage of lime

loses porosity. But since stone, as exemplified by the Indiana oölithic limestone may be initially porous, and since natural porosity of stone is something quite different from porosity created through escape of CO<sub>2</sub>, we would prefer to call it shrinkage or consolidation in respect to the original size of stone. This shrinkage may be quite great, and it is ordinary to find lime in the draw of a kiln that has greater specific gravity than the original stone, even though it has lost almost half of its weight by the escape of CO<sub>2</sub>.

How extremely sensitive lime is to this shrinkage is demonstrated by Fig. 12, based on the tests of Fig. 5 dealing with effect of temperature on the time of calcination. It will be noted that cubes calcined at 1725 deg. F. and 1900 deg. F. did not shrink, but rather expanded, being larger as lime after removal from the furnace than before as stone. Such lime would have a quite open structure, and would tend to be highly reactive. This expansion characteristic was discovered by Warren Weisz of Azbe Corp. in the course of systematic micrometer measurement of the cubes of stone and lime.

The explanation for this peculiarity is that the stone expanded in preheating which expansion was retained after calcining. The lime did not have the tendency to return to the original size of the stone on cooling. The expanded state was greatest at 1725 deg. F. It lost some at 1900 deg. F. thereafter starting to shrink. At 2100 deg. F. it was 7 percent smaller and at 2490 deg. F., 28½ percent smaller.

But the almost 30 percent shrinkage of the high-temperature sample took place only during the upper part of the overheating line, (Fig. 5), that

Continued on page 170

## **Industrial Mineral Developments**

American Institute of Mining and Metallurgical Engineers, Industrial Minerals Division, general meeting in Los Angeles reviews progress through many outstanding papers

THE 175TH GENERAL MEETING of the American Institute of Mining and Metallurgical Engineers was held in Los Angeles, Calif., during the week of February 15, 1953. More than 2000 members and visitors were in attendance. Andrew Fletcher, president of the St. Joseph Lead Co., was installed as president, succeeding Michael J. Haider of the Standard Oil Co. of New Jersey.

The Industrial Minerals Division, which furnished the major part of the program in which readers of Rock Products are most interested, was ably administered throughout the preceding year by Chairman Ian Campbell of the California Institute of Technology. He was succeeded for the coming year by H. M. Bannerman of the U.S. Geological Survey, Washington, D.C.

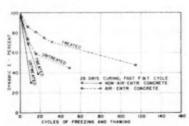
Many papers of wide interest on a great variety of subjects were presented and discussed. The following review is confined primarily to subjects of greatest interest to producers and users of nonmetallic minerals.

## Characteristics of Concrete Aggregates

Katharine Mather of the U.S. Corps of Engineers demonstrated that women as well as men can discuss aggregate problems with keen intelligence. In a paper entitled "Crushed Limestone Aggregate for Concrete" she presented much detailed information on variations in composition and physical properties of aggregates in relation to use and durability. About 70 percent of the concrete aggregate produced in the United States is classed as limestone, but the term includes rocks differing widely in composition and texture. Limestones may consist of almost pure calcite, or they may be dolomitic, arenaceous (sandy) or argillaceous (clayey). They may contain impurities such as quartz, chert, feldspar, pyrite, gypsum or hydrocarbons. The effects of varying compositions, textures and physical properties of the aggregates on the quality of the concrete in which they were used were studied in some detail at the Waterways Experiment Station of the Corps of Engineers at Jackson, Miss

Laboratory studies are helpful at times in determining the best method of preparation of an aggregate. For instance, a limestone bed at a dam site in southern Kansas was found to consist of hard limestone associated with porous, weathered rock, and clay seams. Laboratory tests indicated that the undesirable materials could be eliminated by crushing and washing. Accelerated freezing and thawing tests indicated that the remaining rock was of good quality. An aggregate plant equipped with scrubbers was designed, and a satisfactory aggregate was prepared from an apparently unsatisfactory source.

The mineral composition and texture of limestones in their relation



Showing results of freezing and thawing for one of the gravels under test

to use have not been adequately explored or described. The Waterways Experiment Station has made some progress in this direction and has arrived at the following conclusions based on its experimental work:

(1) The carbonate aggregates have a wide range in composition from calcitic limestone and pure dolomite to argillaceous and arenaceous limestone and dolomite. Each of these types may also vary widely in texture and structure.

(2) The variations in composition, texture and structure result in wide variations in physical and chemical properties, and potential or actual suitability for use as concrete aggregate.

(3) Carbonate aggregates that contain even small amounts of swelling clay, and that also have fairly high absorption, may give poor service, particularly in concrete exposed to severe weathering, or frequent wetting and drying. However, dense argillaceous limestones in which the clay is not of the swelling type may give good service. Determination of the clay mineral or minerals, and the amounts in which they are present, offers the most satisfactory basis for a decision.

#### Reactive Aggregates

Roger H. Cook of the U.S. Reclamation Service presented a paper on a subject of profound interest to all producers and users of concrete aggregates: namely, "Alkali Reactivity of Natural Aggregates in Western

United States." About the year 1940 the adverse effects of the reaction between the alkalies releasd during hydration of portland cement, and certain constituents of the aggregates used, were first recognized. Such reactions may result in expansion and cracking of the concrete. Alkali-aggregate reaction is especially important in massive concrete structures. such as dams; in concrete exposed to weathering, such as highways, bridges, and air strips; and in structures of small tolerance, such as those supporting machinery. The aggregates participating in the reaction contain acidic to intermediate volcanic rock (e.g. glassy to cryptocrystalline rhyolites, dacites, andesites, and their tuffs); the silica minerals opal, chalcedony, tridymite and cristobalite; the zeolite, heulandite; and certain

Alkali-reactive aggregate is of particular concern in the western states because of the widespread occurrence of potentially reactive rocks and minerals. Deposits of reactive natural aggregates occur in the basins of the Missouri, Platte, Rio Grande, Arkansas, Columbia, Snake, Colorado, Sacramento and San Joaquin Rivers. These rivers and their tributaries erode geologic provinces containing formations whose rocks are alkali reactive. These geological provinces are: Pacific Coast, Columbia River Plateau. Great Basin, Rocky Mountains, Colorado Plateau, and Great Plains. Not only the rocks themselves but the sands and gravels derived therefrom are potential sources of reactive materials.

Aggregates should be studied petrographically to determine the content of reactive minerals. The Reclamation Service has identified such materials in 245 deposits west of the Mississippi River. However, there are many good deposits in the West. A peculiar circumstance noted was that large quantities of reactive materials may cause less trouble than small quantities. The larger proportions may result in bonding or puzzolanic effects.

#### **Manufacturing Sand**

It is generally believed that with few exceptions the production of manufactured sand aggregates is sometimes uneconomic, but the Sand and Gravel Division of Henry J. Kaiser Co. has developed methods that are efficient and profitable. The process was described by R. S. Barneyback in a paper entitled, "Rod Mill Grinding for Fine Aggregates." Rod mills

have been used very successfully by this company for manufacturing sand at its Radum plant.

Three sources of material have been used to produce the sand: a feed of coarse sand between 4 and 28 mesh. a feed of medium-grained quartz-diorite crushed to minus % in. and a waste pea gravel between % in. and 4 mesh. Both wet and dry grinding have been employed with output ranging from 32 to 50 t.p.h. Costs range from 25 to 30 cents per ton of finished product, excluding book cost of feed, and first cost of grinding equipment. Gross profits from these operations have run as high as 67 cents per finished ton at the company's Radum plant near Pleasanton, Calif.

The following tabulation presents a concise picture of the performance of one of the mills.

#### DETAILS OF PERFORMANCE OF ROD MILL NO. 1

2400	HO HILLOUINGEROUS ON	
RADUM PLANT	PLEASANTON, CALIF.	the concrete mass;
Installed in 1947	runnion type, end discharge	dition to being expe amination of only th
	by bowl and rake classifier uary 1, 1953-775,000 tons	penetrated by the c veloped improved n

Average production rate is 50 t.p.h. of finished Average consumption of rods is 1,04 lb. per ton of finished sand

ton of finished sand Average consumption of liners and lifters is 0.1 Bb. per ton of finished sand Rod charge—38.5 tons Size of added rods—3 in.

Motor—325 hp. Average moisture of feed- 3 percent Approximate amount of added water to mill-

Approximate amount of added water to mill—60 g.p.m.

Approximate amount of added water in chutes and classifier—600 g.p.m.

Approximate costs to operate, ciation (present day costs);
Operating labor
Repair labor
Rods, liners and repair parts
Power and lubricants

Added water to mill—60 g.p.m.

\$0.95 per ton
0.03

0.03 Total per ton

#### Lightweight Aggregates

A. O. Bartell described "The Expanded Shale Aggregate Industry in the Pacific Northwest." The "Keasey" shale which covers a large area in Columbia and Washington Counties, Ore., is well suited for making lightweight products. The utilization of this material began in a small way in 1947 with production of 75 tons a day. Two plants of much larger size are now in operation, the Empire Building Materials Co., and Smithwick Concrete Products.

Both operators are mining from open pits using jackhammers and relatively light charges of dynamite. The Empire plant loads the broken shale with a "Scoopmobile" directly into a toothed-roll shale crusher located in the quarry. Conveyor belts carry the material from the crusher to the kilnfeed bins. The Smithwick plant loads with a power shovel and the crusher product is carried by conveyor to hopper-bottom rail gondolas.

At the Empire plant the crushed shale is calcined in an 81/2- x 70-ft. brick-lined rotary kiln. A smaller kiln will handle undersized material. The kilns are oil-fired. Hot-zone tempera-

tures are held at about 2120 deg. F The expanded material is reduced with a double-roll crusher, screened. and placed in storage bins for truck loading. Two products sold under the trade name "Lite-Rock" are marketed-minus 1/2-in. material for monolithic concrete, and minus % in. for concrete block. The average weight of the aggregate is 1035 lb. per cu. yd. The company uses the aggregate in its own block plant in southeast Portland, and also sells aggregate to other plants. The Smithwick operation was described in ROCK PRODUCTS. Oct., 1950, p. 163.

#### Concrete Testing

Until recent years the only means of obtaining information concerning the behavior of concrete in situ have been visual inspection and coring. Both methods have obvious disadvantages. Visual inspection gives virtually no information on conditions within and coring, in adensive, permits exhose spots that are cores. Recently demethods of testing were described by R. V. Tye of the U.S. Corps of Engineers in a paper entitled, "The Use of the Soniscope in Testing Concrete." The equipment described was developed by the Hydro-Electric Power Commission of Ontario.

The Soniscope is an instrument which transmits pulses of ultrasonic



Testing soundness of concrete specimen with the aid of the Soniscope

sound through a material, and measures electronically the time required for their transmission.

It appears therefore that the Soniscope provides an accurate, economical means for the non-destructive testing of concrete structures and specimens.

#### **Oregon Limestone**

Limestone occurrences in eastern Oregon are few in number, therefore an appraisal of their size and quality is important. Leslie C. Richards, consulting mining engineer, presented a paper, "Some Physical and Chemical Characteristics of Northeastern Oregon Limestones" which described the deposits in some detail. There are only four limestone deposits in the area considered, the Black Marble deposit in Wallowa County, and the Bulger Hill, Marble Creek and Connor Creek deposits in Baker County. They are all high-calcium limestones. The Black Marble deposit is worked by the Pacific Carbide and Alloys Co. for use in making calcium carbide. Reserves are estimated to exceed 3,-000,000 tons. The Marble Creek deposit which has estimated reserves of 1,900,000 tons, is also suitable for the exacting requirements of calcium carbide manufacture. The only other important application of the limestones in this area is for soil amendment. Strontium and boron are present as trace elements.

#### Perlite

Perlite as a source of lightweight products has attained great importance during recent years. Eugene Callaghan of the New Mexico Bureau of Mines and Mineral Resources described the geology of a perlite deposit now utilized near Socorro, N.M. The area was mapped on a scale of 200 ft. to the inch, and studies were made of the deposit which is of Upper Miocene age or later. The perlite is in the form of domes, dikes and sills. Its significant properties are inherent in the original material, and are not influenced by post-deposition effects. Chemical composition is not a factor in performance. The water content is the important factor. Expansion on heating ranges from 2 to 20 times, but a range of 3 to 5 is the most common.

A companion paper "Pearl Queen Perlite Deposit of Mineral Mountains, Utah" was presented by Gordon L. Bell, consulting geologist, Salt Lake City. The deposit described is 14 miles northeast of Milford, Beaver County, Utah. It was selected for study because of its large size, geologic setting, and uniform purity. It is an acid volcanic glass derived from a higher source, and accumulated in a valley. It consists of about 70 percent silica, 14 percent alumina, 3 percent soda, and 3 percent potash. Crystal chemistry is the tool used to interpret its origin and properties. Perlite is commonly under internal strain to such an extent that it will explode when struck with a hammer, gares, CO, and water, are the effective agents for bloating. It was brought out in discussion that the perlites represent arrested stages in the process of making such end products of vulcanism as tuff's and ash. The bloating of perlite in furnaces is simply a completion in some degree of nature's arrested program.

#### Sand and Gravel Prospecting

Determination of the extent and depth of sand and gravel deposits is generally a tedious and costly operation. Ivor R. Thomas of Henry J. Kaiser Co., in a paper entitled, "Earth Resistivity Surveying for Sand and Gravel Deposits," pointed

out that electric prospecting methods may be applied to advantage. Methods of exploration used in the past included hand-dug test pits, dragline excavation, churn drilling, and test holes made with a small clamshell bucket attached to a vertical boom. To investigate the possible application of earth-resistivity methods to this problem the Henry J. Kaiser Co. secured a Gish-Rooney Type LR earth resistivity apparatus, manufactured by the Geophysical Instrument Co., Division of Georator Corp., Arlington, Va. The complete unit cost \$970, and consisted of the resistivity apparatus, power supply unit, two current stakes, non-polarizing electrodes, four cable reels, and cable for measurements to a 200-ft. depth. Resistivity tests were run against known drilling logs and exposed banks to provide calibration curves. The operators made what might be called a depth profile traverse in which each station on the traverse was tested to a depth of 130 ft. Certain stations were run to a depth of 200 ft. A total of 39 traverses were run, and a total of 331 holes were checked.

The cost of resistivity surveying compares favorably with that of other methods. Basing the comparison on 10 "holes" of resistivity testing, (each "hole" 130 ft. deep) with one test hole by conventional drilling, the cost of the "electrical drilling" would be about 80 cents per foot of sounding. Dragline excavating, good to depths of approximately 50 ft., costs about \$1.50 per foot of hole. Churn drilling to depths of 105 ft., using casing, costs \$3.25 per foot of hole. Drilling with a small clamshell bucket attached to a vertical boom to a depth of 56 ft. costs an average of \$2.75 per foot of hole. These figures are actual costs determined during prospecting work. A quoted price from a driller using a rotary rig making 5-in, holes without casing and sealed with mud, was \$2.75 per foot of hole.

Although the cost of resistivity surveying is much less than that by other methods the information it provides is indicative but not positive. It was concluded that a fairly extensive resistivity survey, together with a few carefully chosen drill holes is the best approach to the problem of prospecting for sand and gravel.

#### Sand Purification

The increasing cost of disposing of great quantities of spent sands at foundries induced the Process Research Laboratory of Allis-Chalmers Manufacturing Co. to develop a paddle scrubber that would remove a substantial part of the charred coatings from the grains, and thus permit reuse of the sand. The satisfactory results obtained suggested that the process could be applied to the purification of sands used by the glass and chemical industries. The equipment and methods used were described in

a paper entitled, "Glass and Chemical Sand Manufacture in the Edwards Paddle Scrubber," presented by J. G. Kirkland of the Allis-Chalmers Manufacturing Co.

Sands from Michigan, Illinois and Ohio tested with this machine were greatly improved. For instance when an Illinois glass sand was passed through the scrubber at a rate of 500 lb. per hour the iron content was reduced from 0.032 percent to 0.020 percent. This made a first quality glass sand out of second quality material. The paddle scrubber has proved to be more effective than flotation or acid leach. A complete paper covering this subject appeared in Mining Engineering, September 1952, pages 875 to 879.

#### Feldspar Recovery From Sand

As many river sands in Kansas run as high as 30 percent feldspar the State Geological Survey of Kansas undertook the development of a process for recovery of the feldspar, and purification of the remaining sand for industrial use. A paper covering the results of the work entitled, "Experimental Production of Feldspar and Silica from Several River Sands in Kansas," was presented by Frank W. Bowdish of the University of Kansas. Six river and flood-plain sand samples from the vicinity of Kansas City, Wichita, Concordia and Salina were treated by flotation methods. An average of five of these tests indicated a recovery of 27.1 percent feldspar with an average alkali content, (K2O + Na2O), of 13.2 percent, and a molecular ratio of K2O to Na<sub>2</sub>O of 3.6 to 1. The silica sand residue was further treated to remove iron-bearing components, and it was found that the iron content could be reduced to 0.03 percent. These tests indicate that both feldspar and sand of commercial quality can be recovered from Kansas sands. The complete report has been published as Bul. 96, Part 6 of the University of Kansas Publications, Lawrence, Kan.

#### Western Gypsum Mining

Gypsum mining methods were cov-ered in a paper, "The United States Gypsum Company Mine, Heath, Montana," by Gerald C. Mathis, mine superintendent. The deposit located in Fergus County, lies at the base of the Ellis formation of Jurassic age, and is in six layers separated by thin shale seams. A modified room-andpillar method is employed. The early practice of hand loading and mule tramming was replaced by the use of portable loading ramps, and locomotive haulage, and later by trackless transportation. Introduction of the latter method made mining 17 percent more economical, and increased man-hour production 400 percent. Auger drills are used, and blasting is with 40 percent dynamite, using millisecond delay caps. The rock is crushed at the portal, and carried by belt conveyor to the mill where millboard is made.

#### **Phosphate Rock**

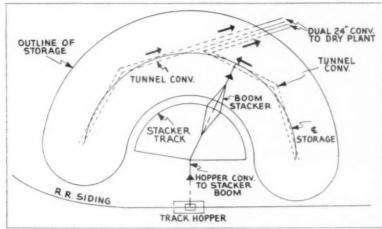
The western phosphate field which is said to contain 60 percent of the nation's phosphate reserves has not been mined extensively until recent years. An important development in Idaho was described in a paper entitled, "Western Phosphate Mining-A Growing Industry," by Charles W. Sweetwood of the Simplot Fertilizer Co. This company began exploration of the Phosphoria formation on the Fort Hall Indian Reservation, and, after establishing a large reserve of high-grade rock, the Gay Mine was developed. As overburden is moderate, and the beds flatlying, open-pit mining is followed. At first only highgrade rock running 32.5 to 34.5 percent P.O. was mined for processing into superphosphate fertilizer at the company's Pocatello plant. Later an overlying leaner rock running about 24 percent P.O. was mined for export, and for sale as "furnace grade" rock for manufacture of elemental phosphorus by the Westvaco Chemical Corp.

The mining plan can be divided into four phases—topsoil removal, waste shale removal, furnace-grade shale mining, and mining of the main highgrade beds. The phosphate rock is crushed to minus 3-in, size and carried on a conveyor belt through an automatic sampler, and delivered directly into 65-ton hopper-bottom railroad cars. Methods and equipment used in mining, preparation and transportation are given in the paper which was published in Mining Engineering, September 1952, pages 863 to 865.

A companion paper entitled "Idaho Phosphate and Its Ultimate Use" was presented by J. G. Miller of Westvaco Chemical Division, Food Machinery and Chemical Corp. This paper was devoted primarily to the utilization of phosphate rock for making elemental phosphorus and its derivatives.

#### A Unique Phosphate Storage System

George L. Lyle, Jr., of the American Cyanamid Co., presented a paper of unusual interest entitled "Wet Phosphate Rock Storage and Handling at American Cyanamid Co.'s Brewster, Fla. Plant." A pit 20 ft. deep contains twin 50-ton feed bins for receiving the phosphate from the bottom of 50-ton, open-top, hopper cars. A "shaker" can be lowered to the top of the car to dislodge hanging material by vibration. Three vibrating feeders discharge the rock to a 36-in. stationary inclined belt conveyor, which elevates the material from the pit to a point 12 ft. above ground where it discharges to a 36-in. conveyor belt operating on a boom stack-



General layout of wet phosphate storage at the Brewster, Fla. plant of American Cyanamid Co.

The boom stacker, the most unique part of the system, consists of a steel truss which carries the belt and its driving mechanism. The truss is supported near the mid-joint by a network of two laced steel columns which travel on a semi-circular track. Thus the discharge end of the boom may be moved from point to point as desired. The boom is inclined upward so that its head end is about 90 ft. above the ground. The rock may be discharged to any one of several piles on a radius of 270 ft., giving a capacity of 320,000 tons of gravity storage.

The reclaiming system consists of a series of reinforced concrete tunnels equipped with reclaiming conveyors. They are so arranged that rock can be drawn to them from any pile and in any combination of grade desired. They discharge through multiple gates and chutes to two 24-in. inclined conveyors which in turn discharge to three rotary dryers. The system is economical and convenient. As different grades can be held in separate storage it eliminates the necessity of selective mining for specific grades to meet fluctuating demands. It has reduced direct material-handling costs by about two-thirds, and provides a flexible system by which customers may be served promptly and efficiently.

#### **Potash Symposium**

A symposium on chemical raw materials comprised an interesting series of papers covering various phases of the potash industry.

G. E. Atwood and D. J. Bourne of Duval Sulphur and Potash Co., in a paper entitled "The Carlsbad Potash Industry and the Geology of its Ore Deposits," outlined the tremendous growth of the domestic potash industry. Before 1931 the United States was almost entirely dependent upon foreign supplies of this essential fertilizer material, but in that year production was initiated in the Carlsbad

area of New Mexico, and output has grown to more than 40,000 carloads annually of refined salts. There are now more than 4000 employees in the Carlsbad area.

As the salts penetrated are more or less soluble in water the cores are preserved by drilling in a concentrated solution of sodium chloride and potassium chloride. Drilling cost is about \$5 a foot for depths up to 1000 ft.

The same authors presented a paper on "Process Development and Practice of the Potash Division of Duval Sulphur and Potash Company.' This new operator came into production in November, 1951, and attained full capacity in 1952. The potash salts are extracted efficiently by a froth flotation process operated under close temperature control. The action of the base-exchange clays associated with the salts is vitally important, and to a large extent dictates flotation practice. The sylvite is floated from the sodium chloride. Precipitation also plays a part in the process.

A paper by G. T. Harley and C. A. Arend, Jr., on "Potash Refining and Processing at International Minerals & Chemical Corporation, Carlsbad, N.M." was presented by H. P. Park. The International Minerals & Chemical Corporation is a large producer and refiner of potash salts. The principal potash-bearing mineral is sylvite (KCl), but this company is also the sole producer of langbeinite (2 MgSO, K,SO,). These minerals must be treated differently. The sylvite is recovered chiefly by flotation. The langbeinite, however, is less soluble than its impurities, hence the impurities are removed by solution. About 95 percent of the output is used as fertilizer, and the remainder is applied to industrial uses. The company operates a chemical plant for production of refined potassium chloride and potassium sulfate.

The operations of another important producer were described by E. A. Schoold in a paper entitled "Processing and Milling Operations at Potash Co. of America." This company conducted pioneer work on the revolutionary process of flotation which has now become standard practice.

James Edmunds of the Potash Co. of America presented a paper of general interest covering "Mining Methods in the Carlsbad Area." Entry to all the mines is through vertical shafts ranging in depth from 725 to 1420 ft. The beds mined ranged from 4 to 12 ft. thick, and the K2O content ranges from 17 to 26 percent. A roomand-pillar system is followed. In the Potash Co. of America mine the pillars are 17 ft. square, and are 65 ft. from center to center. This permits an approximate 65-percent recovery. The spacing and pillar size vary somewhat in other mines. The massive, rock-salt roofs require no timbering.

W. A. Gale of the American Potash and Chemical Co. discussed the application of the Carbon-14 method of determining the age of salt beds, in his paper "Geology of Searles Lake and Discussion of its Age Determination by Carbon-14."

Another staff member of the American Potash and Chemical Co., M. L. Leonardi, discussed the "Major Plant Cycle," employed by this company. A complicated evaporation process is used for recovery of soluble salts from brine.

A third member of the company, Russell W. Mumford, discussed the "Economic Phases of the Potash Industry." He pointed out that potassium occurs abundantly in nature, and that large deposits of potash salts or concentrated brines have resulted from evaporation of seawater and inland lakes. World reserves of soluble potash salts are large enough to satisfy world demands at the present rate of consumption for many hundreds of years, but present known reserves in the United States are relatively small. Potential reserves in seawater and insoluble minerals are enormous. Mining methods trend toward maximum mechanization in the United States and France; but in Germany and Spain mechanization has not progressed as far.

H. I. Smith of the U.S. Geological Survey discussed "Leasing of Government Potash Land." Not until the passage of the Saline Act of 1910 were minerals associated with saline deposits subject to location. In 1916 the United States became almost wholly dependent upon foreign sources of potash supply, and Congress passed a new Potash Leasing Act in 1917 authorizing the issuance of prospecting permits or leases for a maximum 2560 acres in an area 50 miles square, to each qualified applicant. A permittee, upon making a valuable discovery, was entitled to a patent to one-fourth of the acreage in the permit. This feature was unsatisfactory,

as the most valuable land in each permit was patented, and, in the case of brines, a patentee could isolate, and drain brines from public lands. In 1927 Congress revised the Potash Leasing Act to conform to the terms and conditions of the Mineral Leasing Act of 1920 applicable to coal, phosphate, sodium, oil shale, oil and gas. The revised Potash Leasing Act removed any statutory limitation on the number of permits and leases that could be held, but instead provided that the Secretary of the Interior could establish the acreage limitation by regulation. By permitting prospecting in a large area this revision of the law led to the discovery of commercial deposits, which, upon development, freed the United States from almost complete dependence on foreign sources of potash. The Bureau of Land Management is responsible for land titles and legal and administrative matters, and prepares the leases and permits for the approval of the Secretary of the Interior. The Geological Survey recommends lease terms, supervises operations, maintains accounts, and collects amounts due under operating leases. On June 30, 1952 there were in effect 174 prospecting permits in 5 states, and 33 leases in 2 states.

#### Rare Minerals

Commodities of wide interest at this time were discussed at a session on rare minerals sponsored jointly by the Industrial Minerals Division and the Society of Economic Geologists. A paper on "Commercial Synthesis of Star Sapphires and Star Rubies," prepared by Clifford Frondel of Harvard University was presented by Arthur Montgomery of Lafayette College.

Monazite is of particular interest at this time because it is the principal source of cerium earths and thorium. John B. Mertie, Jr., of the U.S. Geological Survey, described the "Monazite Deposits of the Southeastern Atlantic States." The deposits are extensive. The western belt about 600 miles long extends from east-central Virginia to east-central Alabama and an eastern belt about 200 miles long has been traced from Fredericksburg, Va., to a point southeast of Raleigh, N.C. Pre-Cambrian granitic rocks are believed to have been the original sources of the monazite. A typical monazite from these areas contains 63.20 percent of the rare earths, 5.07 percent ThO2, and 0.38 percent U2Os. The deposits were mined commercially in North and South Carolina from 1887 to 1911, but competition with the deposits of Brazil and India terminated the domestic industry. Recent restrictions on exportation of monazite from foreign countries have created a scarcity of this important mineral in the United States, and have stimulated increasing interest in domestic sources.

Niobium is a rare element that has important uses in certain alloy steels. Michael Fleischer of the U.S. Geological Survey covered certain phases of its occurrence and recovery in a paper entitled "Geochemical Association of Niobium (Columbium) with Titanium, and its Economic Significance."

Miss Taisia Stadnichenko also of the U.S. Geological Survey discussed "Minor-Element Accumulation in Coal Ash, and its Economic Implications." Spectrographic analyses of coal ash from various areas indicated the presence of rare elements. A detailed study of ash samples has made it possible to dilineate an area which may provide a source of Germanium.

A paper at another session had a direct bearing on this subject. A. P. Thompson and J. R. Musgrave of the Eagle Pitcher Co. in discussing "Production of Germanium" pointed out that most of the domestic production of Germanium is from byproducts of smelting Tri-State zinc ores, and that England is the only country that reports production as a byproduct of burning coal.

Lithium has attained great importance in the defense program. A paper on "Mining and Milling of Lithium Pegmatites at Kings Mountain, North Carolina" was presented by F. B. Shay of the Foote Mineral Co.

A paper entitled "A Method for Concentration of North Carolina Spodumene Ores" was also presented by Mr. Shay. The new process developed requires two flotation separations—(1) a procedure whereby mica, feld-spar and quartz are simultaneously removed as a froth product with a cationic collector and (2) the subsequent removal of iron-bearing minerals as a froth product while spodumene is depressed as a tailing.

The only deposit of wollastonite, calcium silicate (CaSiOa), now worked commercially is near Willsboro, N.Y. A paper on the subject prepared by Cabot Carbon Co. was presented by Raymond B. Ladoo, consultant of the company. The property was acquired by Cabot Carbon Co. in 1952, and a new plant with a capacity of 60,000 tons a year is nearing completion. Detailed mapping and core drilling have established large reserves. Much research has been devoted to uses which include paint filler, filter aids, and ceramic raw materials. Prices range from \$18 to \$28 a ton.

A series of papers on dimension stone comprised a review of conditions in quarries producing various types of stone in California, granites in Massachusetts and Vermont, and limestones in Indiana. Progress has been made in the development of byproducts, such as chicken grit, concrete aggregate, mineral fertilizer from granite waste, agricultural limestone, and various pulverized products.

#### **Filters**

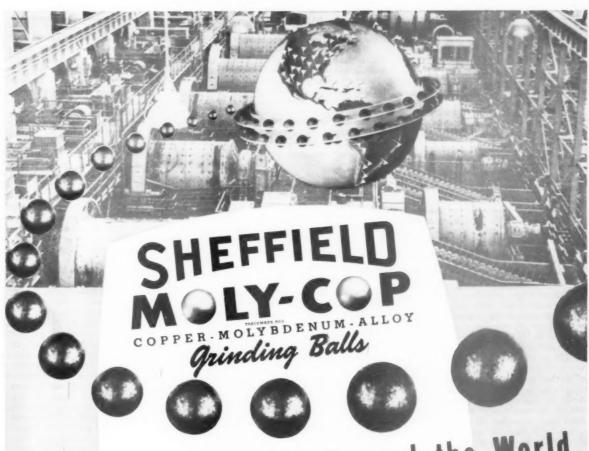
A paper, "The Horizontal Filter and Applications in the Metallurgical Field," by William C. Mason, Oliver-United Filters, Inc., described the Oliver horizontal filter as being a continuous vacuum, or pressure differential filter having its filtering surface rotating in a horizontal plane. It was, in effect, he said, a continuous suction or "nutsch box" and the simplest of all means of separating liquids from solids. The speaker said the filter had been applied to such rock products materials as crushed slag, washed sand, feldspar, gypsum from phosphoric acid, etc. He described its use in one plant where a 15-ft. machine was being used. A 12-in. Dorrclone (liquid cyclone) deslimed the feed to the filter with the underflow dewatered in the horizontal filter. He indicated a capacity of as high as 550 tons per 24 hours or 6660 lb. per day

per sq. ft. of filter area. There was a paper, "Application of the Dewatering Screen to the Metallurgical Industries," by William S. Shira, Allis-Chalmers Manufacturing Co., and one on "Design and Application of Modern Wet-type Magnetic Separators" by William H. Newton and F. R. Elsner, Minerals Beneficiation Division, The Jeffrey Manufacturing Co. The paper described the use of drum-type, wet, magnetic separators and pointed out the advantages of their use for recovery of ferrosilicon (or magnetite) from standard heavy media plants. They also described the various types of separators in use, including the 2- and 3-drum machines, and the counterflow

The theme for a session of the Minerals Beneficiation Section was "Solids-Fluids Separation." This is an important subject to Rock Products' readers for it covers newer and important methods of separating solids (sand, grinding products, etc.) from liquids.

The first paper was by J. J. Gillis, project engineer, Bird Machinery Co., South Walpole, Mass., and titled, "Centrifugal Separators in Mineral Dressing."

Mr. Gillis said there were two general methods of centrifugal separation: batch and continuous, and to our industries the latter was more important. There are, he said, two types of continuous machines: screen and solid bowl-the latter possibly more important. The continuous solid bowl machine employs centrifugal sedimentation and the solids must have a higher sp. gr. than the liquid. Centrifugal force deposits the solids against the walls of the bowl and are mechanically removed. The continuous solid bowl centrifugal machine has greater versatility than the screen machine and can handle as coarse as 12 in. or as fine as a micron. Feed slurries can be thick or thin and do not require thickeners ahead of



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them. Low maintenance costs were cited; for coal, in the 6 to 8 cent-per-ton range.

The speaker outlined the advantages of centrifugal filtration as against vacuum filtration. Altitude and hot pulps have no effects on centrifugal separations of this type. No accessory equipment is required and the problems of filter cloth maintenance do not exist.

The speaker pointed out that continuous centrifugal separators are used not only for filtration but for classification of solids according to particle size. Centrifugal classification has decided advantages over ordinary gravity classification. Feed slurries that are high in solids content are readily handled. Chemical dispersion is frequently eliminated. He gave a few examples of centrifugal classification:

An illustration was a plant in Maryland where calcium carbonate is wet ground in ball mills and classified in a continuous centrifugal classifier to produce 100 percent minus 10 micron solids. Oversize from the classifier, representing a circulating load of 400 to 500 percent, is returned to the ball mill. The fine fraction is fed to a thickener. The thickener underflow is fed to a continuous centrifugal filter for dewatering. The filtrate discharge is essentially clear and the filter cake contains 70 to 71 percent solids. The filter is operated to produce 21/2 tons of finished product per hour.

Another example was a large cement mill in eastern Pennsylvania employing a flotation circuit for upgrading the cement rock. Centrifugal classifiers are used in this circuit. The quarried cement rock is varied grade. Following grinding, the slurry is diluted to a consistency of about 35 percent solids and fed to two centrifugal classifiers, each handling 70 tons of solids per hour. Through classification the coarse size is automatically upgraded. The fine fraction goes to the flotation cells. The quantity to be fed to the cells varies, depending upon analysis of the rock. To control quantity, the speed of the classifier is adjusted accordingly. At one time the machines may be used to make a particle size separation at 15 microns. At another time the speed may be reduced and a cut of 30 to 35 microns obtained. It is all based on analysis of the rock. No operating complications developed and the system has been in successful operation for a number of years.

The speaker pointed out that centrifugal classifiers are also used in other ways in cement grinding circuits. He said the mix frequently contains substantial amounts of clay, and dilution following grinding is not permitted as subsequent thickening is not successful. Ordinary classifying methods could not, therefore, be employed

since it was desired to remove particles 200 mesh and coarser. Centrifugal classifiers handle the slurry at milling consistency, about 65 percent solids. A satisfactory product is obtained and the oversize is returned to the mill for regrinding. The effluent goes directly to the kiln for burning so the circulating load must be kept low, otherwise the fine fraction would be too diluent. The circulating load never exceeds 20 percent, he said.

The speaker said that anyone interested in the possibilities of centrifugal filtration or classification can get in touch with the Bird Machine Co., South Walpole, Mass., who have the Bird Research and Development Center to make pilot plant runs on a substantial scale.

#### **Centrifugal Separation**

There were three papers on the general theme of centrifugal classification and/or separation: "Some Applications of the Centrifuge in Mining and Metallurgy," by Charles B. Ambler, The Sharples Corp.; "Application of Centrifugal Forces to Gravitational Classifiers," by Donaid H. Dahlstrom, and Robert C. Emmet, Chemical Engineering Department, Northwestern University; and "Bird Centrifuges in the Potash Industry," by G. T. Harley and H. P. Clark, Development Division, International Minerals & Chemical Corp.

The second paper by Mr. Emmet and Mr. Dahlstrom is of considerable interest to Rock Products' readers because it outlined some of the basic factors in centrifugal classification. The speaker gave test results on the use of a 30-in. open-top, liquid cyclone at Northwestern University. All the tests were on ground agricultural dolomite of 2.83 sp. gr. He described the details of the construction of the liquid cyclone and it was along the general pattern of liquid cyclones now in use in the rock products industries.

The speaker described test procedures, saying that all runs were made on slurries containing ground agri-

cultural dolomite of 2.83 sp. gr. All particles were very uniform in shape and specific gravity and less than 1 percent were coarser than 20 mesh. The solids were charged to a 250-gal. open tank equipped with a high speed mixer and water was added to obtain the correct solid concentration. A slurry pump fed the pulp to the open-top cyclone through a hand-operated, throttling gate valve for control of flow rate. The overflow, underflow, and weir discharge returned to slurry tank through suitable launders and conducts.

Samples were taken from all discharge streams to secure data on size distributions and solid concentrations. Rates were determined by collecting a discharge stream in a weighing tank for a timed interval. Solid concentration and size distribution of the feed stream were obtained by back calculation from the discharge streams.

The paper was quite extensive, but that section devoted to the effect of overflow rate and volume split is of interest at this time. The speaker said that after many exploratory and test runs, it was established that the sharpest and finest classifications were obtained with only one overflow discharge originating at the cyclone centerline and a streamlined horizontal overflow section. Several runs were, therefore, made at varying feed rates and volume splits to the underflow with constant feed solid concentration. Results are indicated in Table I. The range and average size distribution for the feeds of Table I are given in Table II and indicate suffi-

TABLE II: SIZE DISTRIBUTION OF FEED SOLIDS OF TABLE I

Size Fraction	Wt. % Range	Wt. % Average
+20 Mesh U.S. Std.	0.5- 0.8	0.6
20 x 40	30.8-38.0	34.4
40 x 60	18.1-20.8	19.4
60 x 100	6.5-10.2	8.3
100 x 140	2.9 - 3.7	3.3
140 x 200	2.6- 3.6	2.9
-200	29.1-33.8	31.1

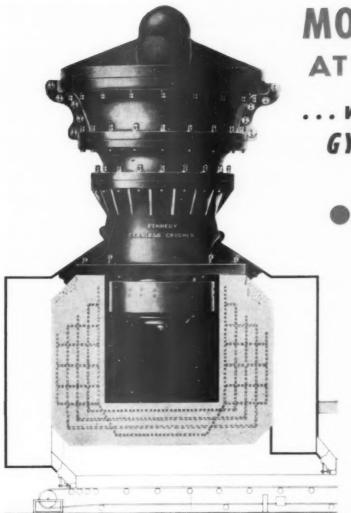
cient uniformity. It will also be observed in Table I that feed solid concentration only varied between 22.0

(Continued on page 178)

TABLE 1: OPEN-TOP CYCLONE
SUMMARY OF RESULTS AT VARYING FEED RATES AND VOLUME SPLITS
ALL SOLIDS 2.83 SPECIFIC GRAVITY DOLOMITE

	Run 113	Run 114	Run 115	Run 116	Run 117	Run 118	*Run 119	Run 120
Slurry Rate—g.p.m. Feed Overflow Underflow	138.2 117.0 21.2	142.9 121.0 21.9	157.6 132.0 25.6	85.5 71.0 14.5	209.3 183.2 26.1	159.0 129.1 29.9	162.3 148.8 13.5	165.7 127.2 38.5
Solida Concentration Wt. % Feed Overflow Underflow	22.6 9.06 66.1	23.4 9.16 69.0	24.5 9.31 69.4	23.5 9.2 66.0	22.6 9.00 74.5	22.0 9.60 57.6	19.10 9.74 75.7	22.0 9.03 52.0
Solids Rate—tons/hour Feed Overflow Underflow	9.08 2.79 6.29	2.92	3.26		13.87 4.37 9.50	10.12 3.28 6.84	3.85	10.56 3.04 7.52
Wt. % Recovered in Underflow +20 Mesh U.S. Std. 20x40 40x60 60x100 100x140 140x200 -200	100.0 100.0 99.7 96.6 80.4 45.4 6.0	100.0 100.0 99.8 96.2 80.3 52.6 9.3	100.0 100.0 99.7 96.2 81.7 56.2 9.9	100.0 100.0 99.9 99.3 87.8 61.1 12.4	100.0 100.0 99.7 93.7 68.3 42.8	100.0 100.0 99.7 95.7 74.2 46.0 12.6	100.0 100.0 99.8 93.2 53.0 19.9	100.0 100.0 99.9 95.8 77.1 45.5 17.0

\*NOTE: Overloaded underflow discharge



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#### Sand and Gravel Meetings

(Continued from page 115)

is supplied a print showing the bbl.
of cement per foot of height for the
bins. Periodically and constantly, a
check is made of actual use of cement
against calculated use. Each cement
scale is checked weekly with test
weights.

It was suggested that truck licenses and insurance be put under the delivery cost breakdown since they are substantial. Employment taxes on plant and delivery personnel would be kept under overhead for a simple system as described, although they could be applied directly to the department concerned. The same is true of rents. The overhead cost per cu. yd. of concrete might surprise many operators.

The simpler the system, the more successful it will be in the opinion of Mr. Murphy. Since one of the most important functions of a cost accounting system is to permit cost comparisons, it is inadvisable to make radical changes in methods at least until the system is fully understood.

Cost accounting systems for sand and gravel operations are more complex because of more operating sources of costs but the costs are virtually the same at all operating points. Most producers would wish to keep certain costs, for stockpiling or loading from stockpiles as examples, separate in order to keep close record of a type of cost that might be studied closely with a view to trimming through adoption of different operating methods.

In conclusion, Mr. Murphy repeated again that an adequate cost accounting will pay out and may actually be the difference between success or failure in a highly competitive market.

### **State Association Activities**

JOINT SESSION for state and re-A gional associations comprised four papers by representatives of four state associations. One was by Claude L. Clark, Columbus, Ohio, executive secretary of the Ohio Sand & Gravel Association and the Ohio Ready Mixed Concrete Association. Mr. Clark outlined the types and scope of the work his associations were doing, much of which related to legislative representation in Ohio. He cautioned his audience to use care in selecting representation to appear before legislative committees, saying that the wrong man could do more harm than good. He felt that the most important legislative efforts revolved about public revenues for construction purposes and that often such revenues can mean the difference between a good year and a lean one. His association, he said, encouraged bond issues for schools and public buildings. Mr. Clark told of the need for vigilence when bills come up before the legislature, citing instances of savings to the industry by either acting offensively, or defensively. He is also interested in such measures as statute of limitation bills, unemployment compensation and industrial insurance bills. As an example of the need for watchfulness, he said that 217 bills were being presented to the Ohio legislature as he spoke. His group is closely watching gasoline and motor vehicle tax bills, especially attempts to put over a weight-

distance tax.

Edward J. Nunan, Buffalo, N.Y., told of some recent problems of the newly formed Empire State Sand, Gravel and Ready Mixed Concrete Association. He said that dues were first set at \$50 for member companies and \$25 for associate members. The schedule of dues has since been advanced on a sliding scale basis (for active members) from \$75 to \$250. A

producer can pay up to \$500 a year maximum under the present scale if he produces both aggregates and ready-mixed concrete. He said that the present budget was in the \$11,000 range. The association has some 70 active members and 40 associate members.

Mr. Nunan told of an ultimatum from the New York Department of Public Works which restricted deliveries of transit-mixed concrete to a maximum of 3 cu. yd. per load and in some instances to as little as 1 cu. yd. His association was successful in getting new regulations issued. He said that one of the greatest problems was the Truck Weight Distance Tax which was described as follows:

"The tax is based on the mileage within the state and the maximum gross weight of the vehicular unit except when the unit is empty. The rates vary per mile from \$.006 for vehicles weighing from 18,000 to 20,000 lb. up to \$.024 per mile for vehicles having a gross weight of over 62,000 lbs. To give an example as to how this tax actually operates: If we have a truck hauling aggregates from our plants to a road project 60 miles away, for example, and that truck weighs, unladen, between 20,000 and 22,000 lb. and carries a load of 15 tons, payment would be at a rate of \$.018 per mile going from the plant to the job and \$.007 per mile from the job coming back to the plant. This makes a total cost of \$1.50 in taxes for that particular trip which, based on a 15-ton load means an additional trucking cost of 10c per ton of material. If the unladen weight of the vehicle is less than 18,000 lb., there is no tax applicable to the return trip if the truck is not loaded. This tax, of course, applies to all types of vehicles, those hauling materials as well as those hauling transit-mixed concrete. The only exemptions permitted

are those trucks hauling wholly within what is known as a Public Service Commission zone which includes generally only that area immediately around the various cities in the state. There is no tax applicable whatever if the truck stays within one of these zones. However, in going from one zone to another, the tax would be applicable and, to make it worse, if a truck makes one trip out of a zone during the calendar month then all of the mileage of that truck for the entire month is taxable.

"This condition has created some very peculiar conditions and, in one case that I know of, has resulted in a considerable loss of business to one sand and gravel producer. This particular plant is located just outside one of the Public Service Commission zones. Within the zone are located another sand and gravel producer and two transit-mixed concrete producers. One of these transit-mixed concrete producers purchased all his materials from the plant located outside the zone as it was a little bit shorter haul than the plant located within the zone. However, since the tax has gone into effect, this operator is purchasing all his materials from the plant located within the zone and is. of course, absolved from any tax.

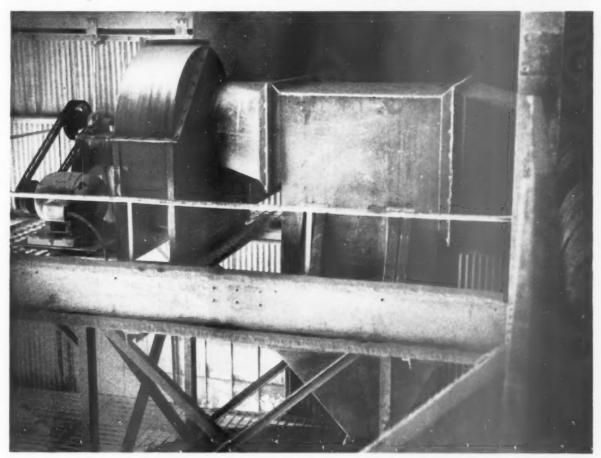
"Another peculiarity of this zoning has a rather direct effect on both transit-mixed concrete producers as well as sand and gravel producers in the vicinity of Buffalo. There is located in Niagara River immediately adjacent to the City of Buffalo, Grand Island, which is probably the largest fresh water island in the world. There is considerable work going on there at the present time both in highway construction and new housing. According to the zoning ordinances, this island is located in a zone with Niagara Falls but is outside of the Buffalo zone; therefore, anything hauled from Niagara Falls onto the island is exempt from tax and everything hauled from Buffalo is subject to tax which, as you can very readily see, creates a rather touchy competitive situation.

"In addition to paying the tax, there is a vast amount of record keeping and office bookkeeping which must be done in order to meet the state regulations. A record of mileage must be kept of every truck every day, whether it is empty or carrying a full load and of course these mileages must be kept separately. The state will not permit the use of any average records even though one truck might be engaged on the same haul for a considerable period of time.

"The law requires every carrier who operates a motor vehicle in this state which is subject to the tax to maintain an accurate daily record of all operations of such vehicle in the state. This daily record of operations shall be in the form of a manifest trip record and the record must contain the following information and

(Continued on page 150)

# WHIRLEX PACKAGE MULTI-CYCLONE EFFICIENTLY RECOVERS HAMMER MILL, SCREEN AND CONVEYOR DUST



This highly efficient package dust collector consists of an induced draft fan and a collector unit. Each is complete and needs only to be bolted into place at erection. The fan casing, the hopper, the collector casing and the cyclone bodies are 3 16 steel plate. All welded construction is used to insure gas tightness. The completed collector unit forms a box girder of exceptional strength with support structure problems reduced to a minimum. The 9CY18S

cyclone tube units are grouped to form a smooth guided inlet for the dust laden gases and a generous hopper is provided to hold the recovered solids. The collector head can be cleaned through special ports without interrupting the operation of the collector. Because of its high efficiency, rugged construction and simplicity of erection, the MTSA-9CY18S package multicyclone dust collector is an ideal solution to most dust problems in the rock products industry.

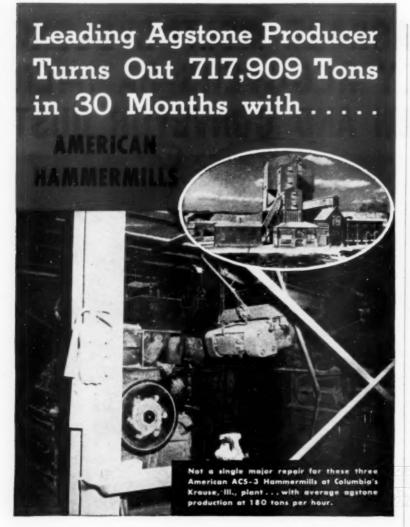
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Since their installation, not one major repair has been necessary on these Americans-in fact, no attention at all, except for the routine refacing of hammers and grate bars.

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St. Louis 10. Mo.

#### State Meetings

I quote:

'The date of each trip.

The permit and vehicle numbers. The point of origin and destina-

tion for each trip.

The number of round trips each

The number of miles traveled laden.

The number of miles traveled empty.

The name of owner.

If operating, leased or an inter-

changed vehicle.' "If the daily manifest is used to record the operations of more than one vehicle, the monthly summary shall be prepared for each vehicle or

vehicular unit at the end of each

"The carrier shall maintain such records as bills of lading; weight bills; freight bills; invoices; shipping orders; dispatch sheets; record of vehicle lease, interchange or hired; drivers' daily logs or trip sheets which are necessary to substantiate the operations of the vehicle. Bills of lading, weight bills, freight bills, invoices or shipping orders should be cross referenced to the particular manifest to which they apply and they should be filed in such a manner that they will be available upon request at the time of audit. In addition, speedometer readings, fuel consumption records, maps, mileage or tariff schedules or record of mileage used for billing purposes and used to compute the taxable mileage shall be kept available. All tax reports and all the records above referred to shall be preserved for a period of five years and shall be kept open for inspection and audit upon request. In addition to all of the above, each truck must have a registration plate for \$5.00 regardless of whether or not this

truck is exempt from the tax."
R. E. Hutchins, executive secretary, Midwest Ready-Mixed Concrete Association, Terra Haute, Ind., discussed "Administration of Short Courses for the Personnel of Mem-ber Companies." He said that such schools were inclined to have speakers who go over the heads of their audience and suggested that such instructors try and talk the language of the operating man. He said that repetition of the same subject, year after year, was often a justified criticism but by including subjects of interest to office personnel and adding variety, interest in the short courses has been sustained. He said that attendance at meetings conducted by the group the first year was 40 and 90 for last year.

E. R. Booker, secretary, Rock, Sand and Gravel Producers Association of Northern California and the Northern California Ready Mixed Concrete and Materials Association, said that the aggregate producers' association had no associate members and that



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Dinner given by Southern California industries for convention delegates. At head table, left to right: Mrs. George Conahey, guest of Mr. & Mrs. Stanton Walker; Stanton Walker; director of engineering, National Sand and Gravel Association and National Ready Mixed Concrete Association; Mrs. N. J. Redmond; N

#### **Californians Entertain**

The day following the San Francisco, Calif., conventions of the N.S.G.A. and the N.R.M.C.A., February 27, the Southern California Rock Products Association and the Southern California Ready Mixed Concrete Association gave a dinner to compliment the members of the two national associations who were returning from the San Francisco conventions by way of Los Angeles.

Held in the Galeria room of the

Held in the Galeria room of the Biltmore Hotel, Los Angeles, the dinner was an attractively arranged celebration and a wonderful send-off to those heading east for their homes. There were no speeches but various individuals were asked to make impromptu comments, funny or otherwise, about happenings at the conventions or anything else that came to mind. All was in a spirit of good fellowship with N. J. Redmond, president of Blue Diamond Corp., serving as master of ceremonies.

#### Collective Bargaining

NATIONAL FOREMEN'S INSTITUTE, New London, Conn., has announced the publication of a 270-page manual on "Conciliation in Action," by Edward Peters, noted conciliator of the California State Conciliation Service. The manual is designed to give management, negotiators, labor relations people and conciliators the inside working techniques of present day collective bargaining and conciliation practice. It is said to be the only book of its kind which gives the step-by-step workings of the office of conciliator and "inside" details involved in the sequence of events leading up to the final management-union agreement.

Copies of the book may be obtained from National Foremen's Institute, Inc., New London, Conn., for \$4.50 per copy.

#### Wage-Hour Violations

VIOLATIONS OF THE OVERTIME PAY PROVISIONS of the Fair Labor Standards Act were the chief cause last year of back wage liabilities for manufacturers of stone, clay and glass products, according to the 1952 annual report of the U.S. Labor Department's Wage and Hour and Public Contracts Divisions. The report shows that employers in the industry paid \$136,676 in back wages to 1783 employes, as a result of the Divisions' activities, not including amounts awarded to employes who sued in court for back pay and liquidated

damages. Of the 583 establishments investigated by the Divisions during 1952, 49 percent were found in violation of the overtime pay requirements; 14 percent had failed to comply with the statutory minimum wage; and 7 percent were found in violation of the child-labor provisions.

"These findings should remind all manufacturers of stone, clay and glass products to make sure they are complying with the Act," advised William R. McComb, wage-hour administrator. "Most violations were due to mistaken ideas about the Wage and Hour Law's applicability to some of the establishment's employes. Complete understanding on the status of every employe would eliminate the chance of having to make unexpected back wage payments."

The Act's provisions apply to employes engaged in interstate commerce or in the production of goods for interstate commerce. Employers who have questions about the provisions of the Act are urged to write to their nearest regional office of the Wage and Hour and Public Contracts Divisions. Regional offices are located in Chicago, Boston, New York, Philadelphia, Birmingham, Cleveland, Kansas City, Dallas, San Francisco and Nashville.

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Price includes complete dragline unit, with std. 25' boom, 36 yd. solid drag bucket, Fairlead, and necessary cable. (Price subject to change without notice).

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When you consider today's high hourly rates for operating big equipment or hand labor, it certainly is worth investigating the money-saving possibilities of the new heavy-duty Bantam T-35 dragline or shovel.

Bigger, heavier, tougher than its famous M-49 "brother," the new T-35 gives you even more work capacity, at the LOWEST OPERATING COST PER HOUR of any machine in the industry! (Based on actual owner records, including depreciation, interest, repairs, etc.)

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... handles up to 90 cu. yds. per hr. In addition, Bantam saves money stripping overburden, re-handling materials to and from stock piles, and cleaning up after larger stripping and loading units.

#### 6-ton crane capacity

Equipped with 25' to 50' boom, the new T-35 promises new economies in handling pipe, slabs, timbers, etc. . . . also gives you a fast, mobile rig for erecting steel, pouring concrete, handling all sorts of utility crane work.

#### Extra income potential

High-speed truck mobility, and 8 fast-change attachments, enable you to keep your Bantam busy the year 'round on rentals or sub-contracts . . . earn extra income, to speed write-off of your original investment.

So don't delay! Ask your Bantam Distributor for a T-35 demonstration today, or write direct for descriptive literature on this new job-proved money-maker.

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## **CONCRETE From Many Angles**

Some general observations on the meetings of the American Concrete Institute and the American Society for Testing Materials Committees

This is not a chronological report of the usual type on convention sessions, abstracts of papers, reports, etc., because the particular subject matters at the A.C.I. annual meeting at Boston, Mass., Feb. 17-19, were largely of only incidental interest to our readers, and much of the data developed at meetings of the A.S.T.M. committees at Detroit, Mich., March 2-6, are not ready for publication yet; in fact they are in the nature of confidential discussions among committee members. Therefore, we are only going to outline the general nature of some of the material gathered and impressions made in the mind of this reporter while sitting in, and interlace this with some of his own thoughts that these impressions give rise to. However, we will try to make

it clear, which is which. The use of concrete, one may say, can be divided logically into (1) design of structures, (2) selection (or testing) of the methods, (3) construction methods, (4) research to determine whether or not expected results are achieved. Strictly speaking, we presume our readers as producers of the materials that go into concrete need be interested in only (2) selection, or testing, and the resulting specifications for their particular materials. However, one can not attend any discussion by engineers and research workers where the subject is concrete or concrete materials, without becoming aware that the concrete, and particularly one or the other of the ingredients of which it is made, is often falsely blamed for failures or defects that should really be charged to the designing architect or engineer. Since it is not considered a good public relations policy for the supplier of the construction materials to do this, he often carries an unjustified burden of abuse.

#### **Design Factors**

Under the subject of Design of Concrete Structures, the A.C.I. sessions included: (1) Report of Committee 505, E. A. Dockstader, chairman, on Proposed Standard Specifications for the Design and Construction of Reinforced-Concrete chimneys; (2) Report of Committee 711, F. N. Menefee, chairman, on Proposed Revision of Minimum Standard Requirements for Precast Concrete Floor Units; (3) Report of Committee 315, Raymond C. Reese, chairman, on Pro-

By NATHAN C. ROCKWOOD

posed Manual of Standard Practice for Detailing Reinforced-Concrete Highway Structures. The following papers concerned more the design angle than any other: (1) Building Foundations on Soft Ground, by Arthur Casagrande, Harvard University; (2) Unit Analysis and Design William Prager, Brown University; (3) Design Equations for Ultimate Strength by Howard Simpson, Massachusetts Institute of Technology; (4) Stability of Thin-Shell Structures by George C. Ernst, University of Nebraska; (5) Yield-Line Theory for Ultimate Strength of Reinforced-Concrete Slabs by Eivind Hogstead, University of Illinois; (6) Static and Dynamic Behavior of Reinforced-Concrete Beams by Joseph Penzien and Robert J. Hansen, Consolidated Vultee Aircraft Corp. and Massachusetts Institute of Technology, respectively.

Obviously, these are all beyond the ken of cement and aggregate producers-and such as the present writer-and are of interest to them only as they may affect the use of concrete as a construction material. In general it would seem that designers are becoming more daring and that concrete is more and more invading the field of structural steel. In other words, the use of concrete in complicated structures, where uncertainty as to stresses and strengths existed, is constantly being extended by more intelligent use of the material. Perhaps this tendency has been unduly stimulated by the current scarcity of structural steel. From discussion, not in sessions, there are apparently some engineers who believe this tendency will not necessarily continue when the present excessive demand for steel in the defense program eases and the tremendous capacity of the presentday steel industry comes seeking new outlets.

This theme was further developed in a series of papers on thin-shell precast concrete, during which the following papers were presented: (1) Thin-Shell Rib Panels Site-Fabricated in Plastic Molds by M. R. Montgomery and T. G. Atkinson, Gunther-Shirley-Trepte Contractors, San Diego, Calif.; (2) Factory Production and Handling Problems of Thin-Shell

Rib Panels by C. D. Wailes, Jr., C. D. Wailes Corp., Los Angeles, Calif.; (3) Precast Buildings for Ammunition Storage, Benton H. Prock, Prock Construction Co., Camden, Ark.; (4) Four Million Square Feet of Thin-Shell Rib Panels for Roof Framing by Charles Zollman, Vacuum Concrete Corp., Philadelphia, Penn., (5) Fabrication and Erection of Precast En-closure Framing for One-Story Barracks by Ford Twaits and Martin M. Twaits-Morrison-Knudsen-Macco, Los Angeles, Calif. All these papers refer more to construction methods, but the concrete units employed, in many cases prestressed, depend upon recent developments in de-

#### **Design Failures**

Thus design affects the producers of cement and aggregates in extending the use of concrete to new types of structures and the manufacture of new types of structural units, but obviously this is a field for specialists. There are other problems in design that more directly affect the producers for they frequently occur in the construction of ordinary types of structures. It would appear from various informal discussions, not in the record, that some architects still do not know how to design large concrete industrial buildings properly. An example cited was a concrete building. with side walls approximately 1000 ft. long. The architect designed a reinforced-concrete frame with floors extending beyond the interior frame so as to form cantilever projections or shelves on which the brick masonry walls were constructed, each floor of course, forming a separate panel. It was not long after the building was completed when it was found that the brick walls were projecting beyond their concrete floor footings. Alleged masonry mortar expansion having received a lot of notoriety in the past few years, the concrete experts immediately suggested expansion of the mortar as the cause. Fortunately, this particular mortar cement has a long and eminently satisfactory record, and an outside expert was able to show that the concrete frame (and floors) had contracted in drying out, and that the brick walls were merely trying to stay put. In either case, of course, the integrity of the brick masonry walls and the concrete frame

(Continued on page 156)

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1750 Walden Avenue Buffalo 25, N. Y. on which they were built would be destroyed.

The real cause of the failure, as determined by a consulting architect who does know how to construct with concrete and masonry, was the omission of expansion joints, there being only one such joint in the middle of the 1000-ft, wall section. In this case the so-called expansion joints would, naturally, have served rather as contraction joints to provide for changes in length by panels in short sections. Reinforced-concrete is fundamentally different from steel in that by continuous drying out, and protection from re-absorption of water or moisture, it undergoes continuous shrinkage up to an appreciable maximum, as well as being subject to about the same thermal expansion and contraction as steel. The masonry mortar being much less dense than concrete is better adapted to absorb expansion and contraction stresses without change in volume. The example quoted is only one of several instances where the materials producers have been blamed for bad experience due almost entirely to poor design by the architect or engineer.

#### **Special Concretes**

Engineers have been debating concrete mix design, cement, water and aggregate and admixture proportions. etc., for some half century without arriving at any foolproof results, and very often with different results. Now they are faced with the design of mixtures for special purposes, which in some instances are exactly contrary to previous conceptions of what constitutes good concrete. The best known example, of course, is the use of airentraining agents, which substitute air bubbles for substance. Apparently, no one now questions that air-entrained concrete is the more durable, at least so far as present experience extending to 10 or 12 years shows, but at the sacrifice of some strength. There was little discussion of air entrainment at the A.C.I. meeting, except a brief report on how the theory of protection from freezing has been extended. It seems that in the freezing of water in the larger voids or capillaries, by the laws of thermo-dy namics, some moisture is removed from the cement gel itself to the air bubble voids, and since the moisture removed from such a gel is not readily re-absorbed, it is possible that the gel is actually improved by such freezing, because one of its shortcomings is that it invariably contains too much water.

Frank H. Jackson, U.S. Bureau of Public Roads, submitted a paper— Ten Year Report on Long-Time Study of Cement Performance in Concrete which apparently clinches the use of air-entrained concrete for pavements. His conclusions were that there is a total lack of correlation between the behavior of concrete exposed to freezing and thawing and the chemical content or fineness of the cement; normal differences in manufacture do not significantly affect durability of concrete; and the increase of sulfate resistance with reduction of potential C.A content of the cement. Substantiating other studies, the evidence was strong that air-entrainment greatly increases the ability of concrete to endure freezing and thawing without deterioration and was found to be particularly effective in preventing scaling when chlorides are used for ice control on concrete pavements.

At the A.S.T.M. committee meetings it was brought out that the tendency, at least among state highway departments, is to increase the air content now generally specified as between 3 and 6 percent to between 4 and 7 percent. There still exists, and perhaps always will, some difference of opinion as to whether to use specially prepared air-entraining cements, or to add the air-entraining agent at the concrete mixer. At the A.C.I. meeting a paper by M. F. Macnaughton and John B. Herbicle of Canada was read which showed that there are some natural sands which entrain far too much air without help from air entraining agents-they contain some organic matter which, however, can be got rid of by thorough washing and scrubbing.

#### **Vibrating Fresh Concrete**

One whole session of the A.C.I. was devoted to vibration devices and practices in placing concrete. These were: (1) Compacting Concrete by Vibration by H. S. Meissner, U.S. Bureau of Reclamation; (2) Vibration Practices in Pipe, Precast, and Block Manufacture by G. W. Washa, University of Wisconsin; (3) Vibration of Mass Concrete by Lewis H. Tuthill, U.S. Bureau of Reclamation; (4) Application of Vibration to Concrete Pavement Construction by A. G. Timms, U.S. Bureau of Public Roads; (5) Vibration Practices in Structural Work by John Banker, Portland Cement Association: (6) Effect of Vibration on Air Content of Mass Concrete by W. O. Crawley, U.S. Engineers' Waterways Experiment Station; (7) Laboratory Tests on Vibration of Concrete by Sven G. Bergstrom, Swedish Cement and Concrete Research Institute.

Of these papers the one by W. O. Crawley was the most thought-provoking for it was stated that cores drilled from mass concrete containing up to 6-in. coarse aggregate showed that it had lost about half its entrained air through the use of the high frequency vibrator, and about the same for a moderate frequency vibrator. On the other hand Lewis H. Tuthill said that vibration has already done much to improve the quality of mass concrete. It has completely changed our concept of what is practical and desirable as a mass-concrete

mix. Together with air entrainment it has made mixes of very low cement content placeable with reductions in unit water content up to 80 lb. per cu. yd. Other improvements in quality or in costs, or both, can result when full advantage of vibration is taken to place mixes with larger aggregate in many cases where there is reinforcing, to place concrete in thicker layers, to permit use of larger buckets, to eliminate poor bond at cold joints.

Hence, one of the chief advantages of using entrained air is to cut down the water content of the mixture, but unless care is taken vibration may eliminate most of the air in the hardened concrete. This seems to be particularly true of pavement concrete. Therefore, there seems to be a trend to return to drier mixtures and possibly to tamping rather than vibration. Thoroughly tamped dry mixes would contain little air entrained by design, but might contain voids otherwise derived. In any event engineers are continually reminded that the German engineers obtained more durable concrete pavements by dry mixtures and thorough tamping than American engineers have obtained even with airentrained concrete. To introduce German practice in this country, however, would require practically a revolution in American construction practice. with a sacrifice of our speedy methods.

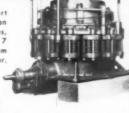
While all the data accumulated in the past 50 years points to the advantages of using a minimum of mixing water, or of getting rid of as much excess water as possible after mixing. there now appears a special field where a concrete retaining a maximum amount of water is highly desirable. This was described in a paper, Concrete for Radiation Shielding, by Edwin J. Callan, U.S. Army Engineers, Waterways Experiment Station. Any concrete is about the best protection from the nuclear energy released in the explosion of atomic bombs, but the thickness of walls or cover slabs may be reduced about 50 percent by the use of concrete containing scrap iron or barite aggregate (heavy concrete). The retention of water in the concrete is desired to absorb the gamma rays, since the hydrogen in the water is most effective for this purpose.

**Concrete for Special Purposes** 

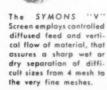
Another case for the need of a very special kind of concrete was described by Herman G. Protze, material technologist, in a paper—Structural Refractory Concrete. This was a case of constructing for airplane jet-engine, test-cell, exhaust chambers, where temperatures reach 1200 deg. F. Durable structural-refractory, lightweight concrete has been developed using aluminous cements and artificial aggregates. Aggregates manufactured by sintering or burning in a kiln certain types of clay or shale to cause expansion are the most dependable.



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In-place cost of the concrete has varied in the current market from \$155 to \$205 per cu. yd. Mr. Protze emphasized that all materials should be kept at as low a temperature as practicable during mixing and placing. Even greater care should be taken to keep that portion of the forms in contact with the concrete at a low temperature, preferably under 40 F. On the projects described, water sprays were used for cooling the forms, and continued after stripping of forms until the concrete had passed the peak hydration temperature.

#### **Blended Cements**

At the A.S.T.M. committee meetings, some of the most interesting discussions concerned possible specifications for blended cements-portland cements blended with some kind of a pozzolan. The Society already has a tentative specification for a portland cement blended by intergrinding the clinker with granulated blast-furnace slag, and a very few portland cement manufacturers are making such a cement, particularly for state highway departments and the Federal Government, which has its own specification. Although the general use of such cements grows very slowly, their evident superiority for durability in some types of structure is becoming too well known for the portland cement manufacturers not to take notice. Since granulated blast-furnace slag is not everywhere available, in many cases the cement manufacturer will have to develop and use a local pozzolanic material.

This fact, we believe, guided the group away from any attempt, at least at this time, to write specifications for the pozzolans that may be incorporated with the cement. Obviously, the character of such natural or calcined pozzolans as may be locally available will vary tremendously, and to attempt to write specifications to cover them all is practically impossible. The saner approach, which seemed to govern the discussion, is to leave the selection and use of the pozzolan up to the cement manufacturer, and hold him responsible for the qualities of his blended cement. That seems the only logical approach anyhow since the same pozzolan will give distinctly different results with different portland cements, as was brought out in the discussion.

One pertland cement manufacturer is now making a granulated slag pulverized with an air-entraining agent and designed to be used as an admixture in concrete, or as an ingredient in blended cements. This material is of a fineness of 95 percent through a 200-mesh sieve. It is itself an hydraulic cementitious material, which will develop an initial set in not less than 45 minutes and tensile strengths in standard 1:3 briquettes of 125 lb. per sq. in. in 7

days and 175 lb. in 28 days. It was argued, we believe with considerable merit, that it was best to pass up at least for the time being, the writing of a specification for blended cement which would include any specific description of the pozzolan that must be used. It was said that to leave the way open for use of any satisfactory pozzolan would spur the portland cement manufacturer to go out and find something locally that could be used by proper processing.

This discussion reminded the writer of his Notes article in the March issue, written prior to his attendance at these meetings. It was pointed out in that article that there is no reason why the portland cement manufacturer can not make a cement in which the pozzolan is an integral part of the product as ordinarily processed. It would simply mean that instead of hard-burning the very finely ground raw materials, we would go back to softer burning or shorter burning of somewhat more coarsely ground raw materials-possibly with a smaller lime content-so that some of the clay or shale would not have reacted entirely with the lime, but would, when ground, be little more than a pozzolanic material. Such a cement, if allowed to age long enough to eliminate any free lime, while slowly hardening might serve the purpose of a blended cement, which appears from experience to make a more durable concrete for some purposes, where speed is not too important.

#### Fly-Ash Discussion

An example of the difficulty in writing a specification for a single kind of pozzolan came out in discussions of the Committee on Concrete and Concrete Aggregates at the A.S.T.M. meetings. A proposed specification defining two grades of fly ash, depending on the carbon content, was voted down, because it has been demonstrated by experience that where perhaps one particular fly ash has given excellent results, the use of some others may be not only not helpful but even dangerous to the quality of the concrete. So far, apparently, fly ash is used exclusively as an admixture; no cement manufacturer has used it as a pozzolan in a blended cement, for which fly ash should be especially suited.

It is interesting to speculate why fly ash should be a good pozzolan. Usually it is fairly high in alkalies. Probably it is because the silica is thus combined as aluminum and alkali silicates that makes the silica more readily available for reaction with the free calcium hydroxide of the hydrated cement. In other words the value of good fly ash as a pozzolan is something more than that of an equally finely pulverized silica. As a replacement of cement in lean concrete mixes it also has the advantage of reducing the water-cement ratio with-

out sacrifice of workability. Since it reduces the amount of cement in the mix it also reduces the heat of hydration in the concrete.

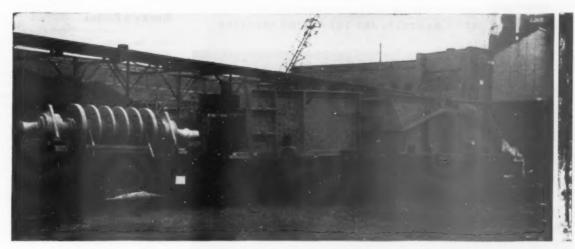
#### **Mineral Aggregates**

Committee C-9 of the A.S.T.M. is still struggling to write a specification for mineral aggregates which can be used without having to fill in the blank spaces in the present specification and yet be general enough to cover a great variety of aggregates scattered over the entire country. The hardest nut to crack appears to be a clause to cover the possibility of reactive aggregates if used with a "high alkali" cement. To get reaction there must first of all be water or moisture in the concrete. It was thought at first that this would eliminate "dry walls" of buildings. However, it is now said that such walls, if in contact with the ground, or withanything else that is moist, will absorb enough moisture to promote the reaction.

Then, examples were given of aggregates that show dangerous reaction by any of the present laboratory tests, and indeed show evidence of reaction when pavement slabs are opened up for microscopic inspection, yet the pavements in question have a service record of ten or twelve years not equalled by aggregates which show no reactivity. Nevertheless, it is said one can not make a "service record" for any particular aggregate the sole criterion because its service record may be confined to one locality where the character of the cements with which it is used may be the critical factor. In short it is very difficult to relate concrete experience with aggregates used; and as one who has probably given this subject as much thought and study as any, has said we will not know how to combine cement, aggregates and water for consistent results until we know a lot more about what is taking place in concrete after it has harden-

#### Effect of Pozzolan

Probably the most attention in the next few years will be devoted to trying to find some consistent relationship between the mineral composition or character of the aggregate and its subsequent changes under conditions of enclosure in cement gel. But even this subject is involved because the character of the cement gel itself can be changed, as for example by use of entrained air. There seems to be no question, either, that the use of a pozzolan may change the character of the gel. In either case, it was shown that aggregates which might not give satisfactory service with normal portland cement do give much more satisfactory service with these special cements or special concretes.



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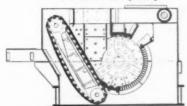
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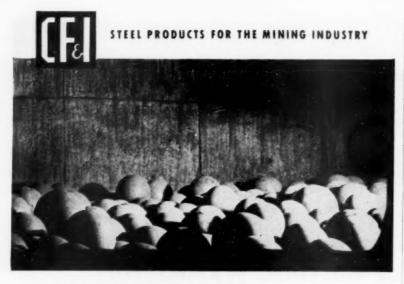
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#### Rocky's Notes

(Continued from page 81)

left the farm. Next to sodium the mineral element most easily lost by solution is calcium.

Consequently the use of lime to restore the element calcium was one of the earliest arts of agriculture practiced. However, for a long time lime was considered chiefly as a "soil conditioner", acid neutralizer, etc., rather than as supplying a necessary mineral element. When lime is used with barnyard manure, which supplies phosphorus and other minerals, as well as nitrogen, a system of practically perpetual fertility of the soil can be maintained. When lime alone is used, one of its functions is to render the other mineral elements in the soil more readily available (by base exchange), so that liming the soil tends to exhaust its fertility more rapidly. "Lime and lime without manure makes the farmer rich but the son poor", so goes the old proverb.

When these facts became self-evident it required only someone with a broadened outlook to ask why the farmer should buy "complete commercial fertilizer" containing potash, phosphorus, nitrogen, etc., when perhaps his soil needed only one or two minerals. In that case the cheapest and most foolproof way to supply these was obviously to do it as Nature does it by adding pulverized rocks which contained these elements. The most fertile lands in the world are mountain and river valleys and flood plains where Nature annually deposits fresh supplies of newly pulverized rocks and mineral solutions. It is Nature's own way of preserving soil fertility. The place for soil conservation dams and barriers is back on the farms and ranches, not huge dams on rapidly flowing streams. These great dams catch some of the sediment, but is not where it does the farmers any good, and the back waters cover thousands of acres of the most fertile soil, occasionally overflowed to be sure, but for that reason kept fertile.

#### Utilizing Common Natural Resources

We have been somewhat amused by recent articles in a contemporary featuring the possibilities of using fine ground rocks other than limestone, as fertilizer, as if this were a new discovery or idea. The fact of the matter is that the then editor of ROCK PROD-UCTS took part in and did his best to help organize a conference on Utilization of Natural Soil Fertility Resources in September 1920-or some 33 years ago. An article on the first conference and its objectives appeared in our journal of September 11. 1920. The prime movers in this effort were H. H. Macdonald, then secretary of the Gypsum Industries Association, and the Association's part-time agricultural advisor, Dr. William Crocker. professor of plant physiology at the University of Chicago. Dr. Crocker

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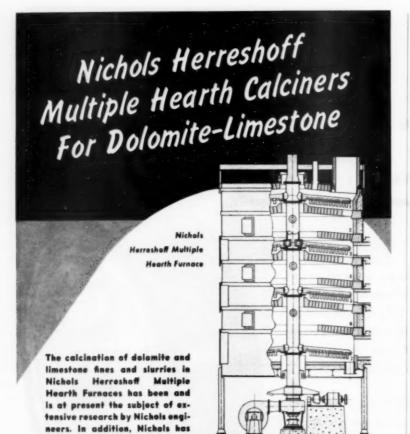
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knew better than any contemporary that plants grown on worn-out soils were subject to diseases, but no one then, and probably now, could put his finger on just what particular minerals were missing in all cases, because some occur in such minute amounts. Consequently, he believed one should follow Nature and supply pulverized rocks which contain practically all of soil minerals, and in proportions that Nature itself had proved were not dangerous or toxic.

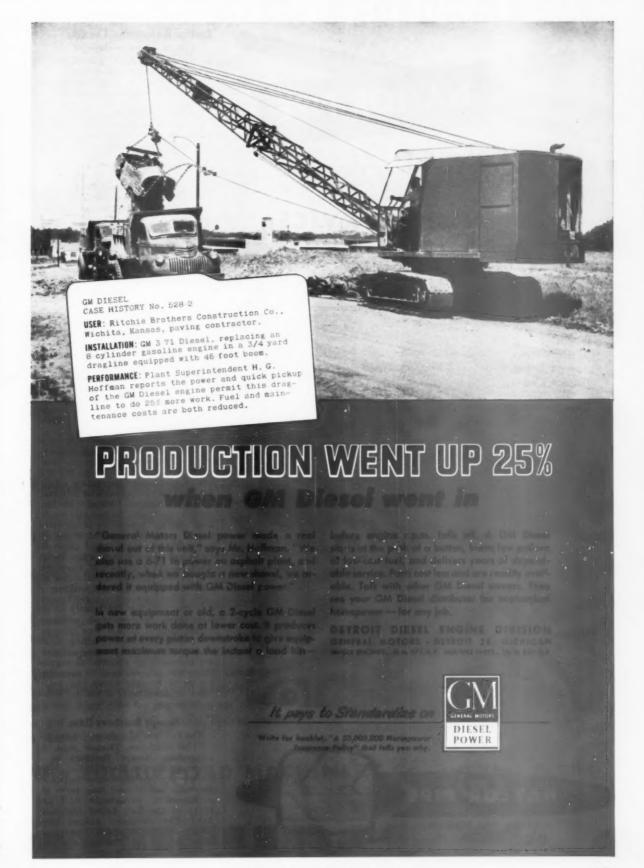
Subsequently, we published several articles by Dr. Crocker and others advocating the use of certain ground feldspars, green sands, etc., as natural soil restorers. In February 1921 a real attempt was made to found an Association of Natural Soil Fertility Resources, but evidently this was more than 30 years ahead of the times, for the scheme did not carry through. The agricultural limestone producers, who should have taken a leading part in organizing such a group, were not interested. The idea was an association of association groups, in which the identity of each group would be preserved. Soon after this Dr. Crocker left Chicago to head the Boyce Thompson Institute for Plant Research at Yonkers, N.Y., and the gypsum industry became too busy making plaster and wallboard to care about developing a market for agricultural gypsum. We always suspected also that the commercial fertilizer industry had a hand in squelching the project.

In the last few years interest in the general subject has revived. In fact there is a small monthly magazine called The Organic Farmer devoted to promotion of the use of pulverized rock fertilizers. In it we find advertisements for phosphate rock, "potash rock" or pulverized Georgia granite and other kinds of pulverized rock sold in bags under various trade names. There is also published a monthly newsletter called Normal Agriculture devoted to the same objectives. The first is now in volume 4. and the second in volume 2, so that we can honestly claim to have been 30 years ahead of the procession. which proves, as we have often noted. that it takes at least a quarter century for a good idea or a good suggestion to take hold.

Maybe the time is not ripe yet to start promotion of natural rock fertilizers in a big way, but any crushed stone producer who is wasting dust or fines is throwing away a natural resource that could be used profitably, most likely on nearby farm lands.

#### **Opens Lime Plant**

ROCKWELL LIME Co., Rockwood, Wis. (near Manitowoc), has announced the opening of its new plant which features a gas-fired rotary lime kiln. The company produces quick and hydrated lime, domestic Vienna lime, horologic lime and other lime and limestone products.





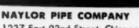
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to time be amended, modified or rescinded by the administrator . .

We decline to repudiate an administrative interpretation of the Act which Congress refused to repudiate after being repeatedly urged to do so.

"There is an objection to the scope of the injunction, but we are satisfied with the Court of Appeals' treatment of this contention.

"Affirmed."

#### **Dissenting Opinion**

"Mr. Justice Douglas, with whom Mr. Justice Frankfurter concurs, dissenting:

"The Court reasons that if the man who is building or repairing an interstate highway is 'engaged in commerce,' the one who carries cement and gravel to him from a nearby pit is engaged in the production of goods for commerce. Yet if that is true. how about the men who produce the tools for those who carry the cement and gravel or those who furnish the materials to make the tools used in producing the cement and gravel? Each would be essential to the highway worker engaged in commerce. Yet the circle gets amazingly large once we say that the production of goods for commerce includes the production of goods for those engaged in commerce. Cf. McLeod v. Threl-keld, 319 U.S. 491.

"A person who is maintaining or repairing interstate transportation facilities is engaged in commerce. Overstreet v. North Shore Corp., 318 U.S. 125. A person who is creating articles destined for the channels of interstate commerce and all others who have such a close and immediate connection with the process as to an essential or necessary part of it are engaged in the production of goods for commerce. See Kirschbaum Co. v. Walling, 316 U.S. 517. If those who serve those engaged in commerce are also included, a large measure of cases affecting commerce are brought into the Act. Yet the history of the Act shows that no such extension of the federal domain was intended. See Kirschbaum Co. v. Walling, supra, pp. 522-523. If those whose activities are necessary or essential to support those who are engaged in commerce are to be brought under the Act. I think an amendment of the Act would he necessary.

#### **Hempt Brothers Case**

The full text of opinion follows:

"The petitioner Thomas sued the respondent Hempt Brothers in a Pennsylvania Court of Common Pleas to recover overtime wages, liquidated damages, and counsel fees under the provisions of paragraphs 6, 7 and 16(b) of the Fair Labor Standards Act.\* The complaint alleged these facts: Hempt Brothers operate a stone quarry in Pennsylvania, use the stone in manufacturing cement

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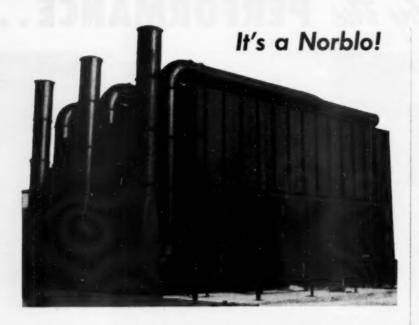
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mixtures, and then haul these mixtures in trucks to customers. Their customers were the Pennsylvania Turnpike, the Pennsylvania Railroad Company, an airport, an army depot, and a navy depot, all located within the State of Pennsylvania. The concrete was processed for these customers. The Railroad used its concrete for repair and maintenance of its roadbeds over which were operated interstate passenger and freight trains. The Turnpike used its concrete for laying and building a highway which handles the flow of commerce between the states. The airport used concrete to build and erect landing fields to accommodate the flow of airplanes in interstate commerce. Other purchasers used their concrete on projects which aided the flow of commerce, as will be proven by Plaintiff when he has his day in Court. Thomas was employed in producing and handling the quarry and concrete prod-

"On these allegations the Supreme Court of Pennsylvania sustained the trial court's judgment for Hempt Brothers entered on the ground that the complaint failed to show a recoverable cause of action under the Fair Labor Standards Act. 371 Pa. 383, 89 A. 2d 776. And see 62 Pa. D. & C. 618, 626 (1948); and 74 Pa. D. & C. 213, 218 (1950). In sustaining dismissal of the complaint the State Supreme Court recognized that its holding was in conflict with that of the Third Circuit in Tobin v. Alstate Construction Co., 195 F. 2d 577. We granted certiorari because of this conflict. 344 U.S. 895.

"We have today affirmed the Court of Appeals' judgment in the Alstate case. The reasons we gave for affirming that case require that this case be reversed because the state courts erred in holding that the complaint failed to set out a good cause of action under the Fair Labor Standards Act. Accordingly the judgment of the Supreme Court of Pennsylvania is reversed and the cause remanded to that court for proceedings not inconsistent with this opinion.

"Reversed and remanded."

"Mr. Justice Frankfurter and Mr. Justice Douglas dissent for the reasons stated in the dissenting opinion in No. 296, Alstate Construction Co. v. Durkin, ante."

## Dallas Concrete Manufacturer Loses to Truckers

The National Labor Relations Board has decided a case in which the Dallas General Drivers, Warehousemen and Helpers, Local Union No. 745 (A.F. of L.) sought to organize the truck drivers of the Dallas Concrete Co. The decision went against the producer. The Board's decision, concurred in by Messrs. Herzog, chairman, Murdock and Peterson, members, found that (1) the

\*52 Stat. 1060, as amended, 63 Stat. 910, 29 U.S.C. \$\frac{1}{2}\$ 206, 207, 216(b).



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## ...including 300 tons ag-lime without blinding!

Performance facts, worth reading twice... from J&K Stone Company's 100% Deister-equipped plant at Muncie, Ind. Partner-owners Kenneth K. and F. W. (Jake) Irving are using 14 Deister Screens at present—five at Muncie, the others at their quarry near Eaton, Ind., and the J&K gravel pit north of Muncie on Highway 3.

"High-speed performance—easy cloth-changing—and no breakdowns are why we've standardized on Deister Screens", says Kenneth Irving; "and after 28 years of using Deisters, we ought to know! Of the five Deisters in our Muncie operation—ranging from 1 to 8 years old—none has given any trouble. We're getting 40% aglime—without blinding. That's why there's a sixth Deister going in here—right away!"

The Deister performance facts from J&K are part of a long list from the Deister customer files—including many operations with problems similar to yours. Write now for specific information on how Deister Vibrating Screens can step up your production, reduce maintenance costs—and produce better sizing, cheaper!

Delster 4' x 8' double-deck
Vibrating Screen

Yibraring Screen

DEISTER MACHINE COMPANY

FORT WAYNE 4, INDIANA

N.L.R.B. had jurisdiction over this ready-mixed concrete company because it furnishes materials valued in excess of \$50,000 annually to public utilities, city and state governments for repair and maintenance of highways; that it was also engaged in producing products for out of state shipment in excess of \$25,000 annually. The decision also found that the employer interferred with the union organizing activities by granting a unilateral wage increase, by threatening to close the plant, by promising refunds to employes of their \$6.00 initiation payment, "if they would forget the union," and questioning employes about their union affiliation. The decision said also that the employer refused to bargain and that his refusal to bargain could not be justified by contending the union's request for recognition was in a form letter signed by the business agent's secretary. The decision gives the incidents leading up to the

case as follows:

"In early June 1951, several of the employer's mixer-truck drivers decided to join the union. Upon learning of the unrest among the mixer-truck drivers, the employer embarked upon a campaign to thwart their concerted activities. The employer promised them a wage increase if they would forget the union. About June 13, 1951, the employer granted the increase retroactive to June 3.

"On June 21, 1951, 11 of the 18 mixer-truck drivers joined the union. The next day the union notified the employer by letter that a majority of the mixer-truck drivers were members of the union and requested a meeting with a company official who had the authority to deal with the union for the purpose of discussing arrangements whereby the union might be recognized as bargaining agent for these employes. The letter was sent by registered mail, return receipt requested. The employer received the letter on June 25, 1951, but never answered it.

"Upon receipt of the letter, the employer, through key officials, took immediate action to stop the organizational efforts of the union among its employes. The employes were questioned about their union affiliation, the extent of the union's organizational effort, and the identity of the union leader. This interrogation was coupled with threats of reprisal for union activities and promises of benefits if employes would abandon such activities.

"The employer asserts that he did not answer the union's letter because (1) the letter on its face did not merit any consideration because it was obviously a form letter and signed by the business agent's secretary, thus leading him to believe that the union was not serious in its request, (2) he had no knowledge of any union activities among the employes, (3) he seriously doubted then and does now

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MODEL 1055 - 3 1/2 yords MODEL 955A - 21/2 yards

Strength was no afterthought on this husky machine. It started on the drawing boards - with all-welded construction of tough rolled steels - with extra strength where strength is needed — with the ability to absorb continuous shock loads . . . and the stability to let you use full power for bigger production. It is the steady digging, without time-outs for pampering, that saves you money.

Add smooth hydraulic control to cushion operations and reduce operating fatigue, and you have the built-in advantages to make all kinds of rock work more profitable. The Model 1055 (31/2 yard) and the Model 955-A (21/2 yard) have proved it. Ask to see one on the job.

## **MAGNETORQUE**\*

gives you the slickest, fastest cycle you've ever known on machines of this size . . . from 15% to 25% faster than any others! And there are no delays for adjustments or replacement of swing frictions. Magnetorque eliminates all that and lasts the life of your machine.

.T.M. of Harnischfeger Corporation for electro-magnetic type coupling.

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The "ELECTRIC EAR" compensates for changes in hardness and size of feed and enables you to produce a more uniform oversize. It increases mill efficiency 8 to 20% \* and frees the operator for other duties.

A perfect grinding team is the Hardinge "Electric Ear" controlling the operating rate of the Hardinge CON-STANT-WEIGHT FEEDER (lower right) which regulates feeding materials by weight instead of volume

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These figures are based upon several hundred tested units.



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that the union ever represented a majority of the employes, and (4) if the union was serious about its claim, it would have made further efforts to see him. Employer contends that under such circumstances he was not required to answer the union's letter. There is no merit in this contention.

"There is nothing in the N.L.R.A.. or in its interpretations by either the Board or the courts that requires that such letters be drafted in any particular form. Nor was the union required to make repeated formal demands upon the employer for recognition in view of the employer's illegal conduct which began on the very day that the employer received the union's letter.

Accordingly, the Board ruled that the 11 out of 18 concrete truck drivers constituted a legal bargaining unit, and the employer's motion to reopen the record for the purpose of showing that the union had lost its majority status was denied because the Board held that any such loss of majority would be attributable to the employer's unfair labor practices. Hence a cease and desist order to the employer, who was ordered to bargain with the union upon its request.

#### Lime Manufacture

(Continued from page 139)

is in only about two minutes of time. If the lime had been retained at this temperature for a prolonged period of time, as it is common in kiln practice, shrinkage would have been far greater.

Figs. 5 and 12 combined demonstrate conclusively that, barring combinations of minutely dispersed readily reacting matter which as in hydraulic lime may react at calcination temperature, all shrinkage and other quality impairment takes place during the overheating period, and the rate of preheating has nothing to do with it whatsoever. Neither has the rate of calcination as long as the lime remains near the temperature of calcination.

But no piece of lime during calcination is at the same temperature throughout. The outer regions naturally are hotter and temperature equalization may take place only after calcination is completed. When the size of stone is small, the temperature differential may be small. When stone increases in size the differential becomes greater, and at high rates of calcination may become quite great. Then the lime, particularly of the outer corners and of the projecting wedges of irregularly sized pieces. may become quite considerably hotter and in nature or quality, quite different from lime in the center of the same pieces.

To determine this a 2-in. cube was drilled for location of one thermocouple in the center and of a second in a corner 3 in. below the surface. This sample was inserted in a fur-

(Continued on page 172)



# the OLIVER Model "B" Crawler

Long considered the finest tractor-loader combination in its class, the Oliver-Ware Model "B" is now built for even greater performance. There are now 5 lower track wheels instead of 4, and the front idler wheel is considerably larger. This means you get more track on the ground, greater stability, more traction, easier handling all the way around. It means faster loading cycles, more work done per day, lower costs and more profits for you.

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Model "B" Crawler. 110° bucket rotation and 28° "tilt back" give you a full bucket every time. Bucket level is automatically maintained when lifting load, preventing wasteful spillage. You can control speed of discharge. And, even with the "tilt back" action, you still have a 32° (from vertical) dump angle... a control range no other loader can surpass.

For complete information on how the Oliver-Ware Model "B" tractor loader can cut costs for you, see or write your Oliver Industrial Distributor.

## THE OLIVER CORPORATION

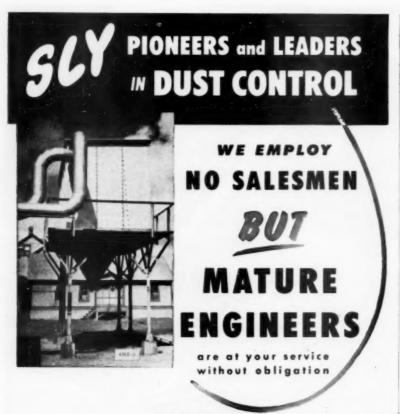
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and crawler tractors



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ROCK
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nace at 2110 deg. F. Fig. 13 presents the results.

The corner preheated extremely rapidly, the center very slowly. The corner was lime in 10 min., the center not for two hours. The corner raised rapidly to within 150 deg. F. of the furnace temperature, the center remained at 450 deg. F. below it. The temperature-time history of the corner was entirely different from that of the center, and the nature of the lime therefore had to be different as well.

In this case such a condition would not do much damage because the temperature was only 2110 deg. F. At higher kiln temperatures, however, and with larger stone, the outside layers would have acquired a much higher temperature, and occasionally we find surface lime sintered when its center is still stone.

However, we believe that the greatest damage to lime occurs in the overheating subsequent to complete calcination through prolonged kiln retention. In view of this, calcination should be conducted under conditions of low temperature and a high rate of gas flow for an almost equally high surface heat transmittance compared to high temperatures and low-are rates of gas flow that may have been used in the past.

(To be continued)

#### Folsom Dam Plant Changes

SINCE THE ARTICLE, "Processing Aggregates for Folsom Dam" (see March, 1953, issue of Rock Products, p. 72) was prepared, important changes have been made in the sand recovery system at the Folsom plant. At the preliminary sand plant a 60-in. Wemco sand preparation machine has been added. It receives a split flow from the rotary screen, the other half going to the previously installed sand spirals. The overflow from these units is pumped to a 24-in. Whirleycone and the recovered fines are added to the sand surge pile.

At the final sand recovery plant, the overflow from the Dorr rake is picked up by a 5-in. Wilfley pump and delivered to a second 24-in. Whirleycone. The fines recovered are returned to the head end of the Dorr rake classifier. The purpose of the liquid cyclones is to recover more 100-, 200- and minus 200-mesh material. Some operating results on the use of the Whirleycones will be published in a subsequent issue as test work on these sand recovery units is still in progress at Folsom.

#### **Gravel Plant**

LEA COUNTY SAND AND GRAVEL Co. is building a new sand and gravel plant near Eunice, N.M., which is expected to double present output. Primary construction work is currently underway. Cost of the new plant was estimated at \$100,000. Operations will be maintained at both the new and old plants.

# Outstanding performance is Standard performance

with **B&W** Feed Pipes...

Tail-Ring Castings

In cement kilns throughout the industry, long-lived B&W alloy Tail-Ring Castings and Feed Pipes have established a firm reputation for outstanding performance and economy by reducing operating costs and contributing to sustained high production.

B&W Tail-Ring Castings withstand temperatures exceeding 1800 F at the feed end of the kiln; standard kiln lining only is needed. These castings provide a kiln opening of proper size, and are designed with overlapping segments, which prevent loss of feed material and allow ample expansion to minimize the possibility of belling out of the kiln shell.

Because greater resistance to heat and wear is "built in" at the foundry, B&W cast alloy Feed Pipes consistently outlast conventional types by wide margins under the most rigorous service conditions. A typical design, illustrated, incorporates a special clamp, located according to specific service conditions, and permitting renewal of only the lower portion of pipe after years of punishing service . . . a further cost-saving feature.

For detailed information in relation to your requirements write: The Babcock & Wilcox Company, Process Equipment Dept., Barberton, Ohio.







RUGGED, rock-ready construction . . . that's just one of the Heil Rock Body features that hits the bull's eye every time for profitable operation on the toughest jobs. Heil Rock Bodies are fabricated of ¼" (or heavier) steel plate, with box-member ribs providing rigid reinforcing for maximum strength. Floor has a 2" hardwood cushion sandwiched between body bottom and wearing plate to absorb the shock of loading with big buckets. Subframe construction with both cross members and long members interlocked and welded into a single assembly prevents sagging of the body floor.

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HEILINER 13 AND 18-CU, YD. SCRAPERS



HEILINER 20-CU. YD.



BH-8

CABLE POWER

#### **State Meetings**

om page 150) dues were based on annual tonnage produced. The rate of dues per 1000 tons depends on the size of the budget adopted. Mr. Booker brought out that most of his association's work had to do with union negotiations and spoke at considerable detail on practices followed. For the ready-mixed concrete industry, dues are assessed on the basis of the average number of production employes. The principal emphasis for this association, he pointed out, was also largely with labor negotiations and he told how that phase was handled. His association is interested in health and welfare plans. He said, "We know from our experience during the last six months that the best thing for employer organizations to do in connection with furnishing health and welfare benefits is to initiate its own plan with benefits comparing to benefits furnished under union-negotiated plans within its own area. The least desirable procedure is to become involved in a negotiation deal wherein a union broker is used. The broker selects the carrier and administration is vested in an administrative office which is too closely connected with the union."

Between the scheduled talks, Chairman H. G. Feraud outlined some features of his associations in the Los Angeles area. He told of an area-wide safety program that included 30 industries and for which the Azusa Rock & Sand Co. was the sweep-stakes winner. Mr. Feraud told of working in close harmony with Mr. Booker's associations and said that this year there were some 5000 (five thousand) bills pending before the California legislature which must be screened and watched as some are vicious. He told of a new "Truck Freeway" in the Baldwin Park area near Los Angeles that carried up to 240 trucks per hour and resulted in a saving of about \$400,000 per year to the aggregates and ready-mixed concrete producers in the area.

#### Manufacturers Division

Business affairs of the Manufacturers Division, N.S.G.A., were transacted at a breakfast meeting under the chairmanship of R. D. Ketner. V. P. Ahearn first spoke about exposition plans for the 1954 conventions to be held in Chicago. Some of the manufacturers continue to be interested in the idea of holding expositions in a public auditorium outside the convention hotel, in order to accommodate larger expositions and larger equipment. Mr. Ahearn recommended that the Division appoint an exhibit committee to consider such matters and the plan, as decided upon,

is to rotate such committee each year.

The Division lost three members this past year but gained three new ones. Chairman E. M. Heuston of the resolutions committee submitted an appropriate resolution thanking president A. R. Shiely of N.S.G.A., chair-

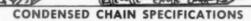
# ELEVATOR DOWN" TOO MUCH?

Look up your answer here?

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It's an important point to consider because chain breakage is seldom the fault of the chain. It could be that it's misapplied.,, not strong enough for the job! Just take a look at the table. You'll see the complete Rex line at a glance. Find the chain you're now using and see how easily you can move up into a stronger chain...one that will give you longer service...eliminate excessive, expensive down time.

We suggest, too, that you consult your Rex Field Sales Engineer. You'll find he's able to give you a lot of valuable help in a chain selection...help that will save you plenty.



If You Are Using	And Want a Stronger Chain, We Recommend	Use Same Sprkts.	New Sprkts. Req'd.	Chain No.	Pitch	Working Load	Ultimate Strength
†823	825		V	*†823 Ley Bushed	4.000	3,150	19,000
131 5131	S131 S825	<b>V</b>	V	*131 Combination \$131 Chabelco	3.075	3,200 4,450	24,000
†825 \$825	S825 S102½	v	V	*†825 Ley Bushed S825 Chabelco	4.000	5,000	30,000
†830 5830 A102B	5830 5844 5102B	V	<b>√</b>	*†830 Ley Bushed \$830 Chabelco	6.000	5,000	30,000
5102B	S102b S102½ S110	V	<b>V</b>	*A102B Durobar S102B Chabelco	4.000	4,000	24,000
S110 A1021/2	S844 S102½	V	<b>√</b>	*110 Combination S110 Chabelco	6.000	4,000	24,000
\$102½ A111 \$111	S111 S111 S844	V	\ \ \	*A102½ Durobar S102½ Chabelco	4.040 4.040	5,600 7,800	36,000 50,000
†844 S844	S844 S856	√	, , , , , , , , , , , , , , , , , , ,	*A111 Durobar S111 Chabelco	4.760 4.760	6,000 8,400	36,000 50,000
A132	SA150	V		*†844 Ley Bushed	6.000	6,650	40,000
is approx with heat t	be shipped in imately 25% treated pins.	stronger;	furnished	*A132 Durobar SA150 Chabelco	6.000 6.050 6.050	9,200 8,400 15,000	70,000 50,000 100,000
	be furnished bushings.	with alloy	pins and	S856 Chabelco	6.000	14,000	100,000

Get the full story on how the complete line of Rex Chains can help you get the most out of your elevating, conveying and power transmission equipment. Write for Bulletin 52-53 today or call your nearest Rex Field Sales Engineer. Chain Belt Company, 4649 W. Greenfield Ave., Milwaukee, Wis,



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An economical machine for hill and pit excavation, reclamation and handling of materials, wet or dry. A rapid conveyor for long range earthmoving.

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Unequalled for operations that require deep digging—especially under water—and conveying to a high delivery point.

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CARLISLE, PA.

man R. D. Ketner of the Division, the two northern California associations, executive secretary V. P. Ahearn and staff for their cooperation and help this past year. This resolution was passed unanimously as was one to send a letter of sympathy to the family of C. S. Huntington who passed away on December 26, 1952. Mr. Huntington of Link-Belt Co. was a past chairman of the Division.

E. M. Heuston, Bucyrus-Erie Co., South Milwaukee, Wis., was elected chairman of the Division. D. McM. Blackburn, Hendrick Manufacturing Co., Carbondale, Penn., was elected a vice-chairman. Re-elected vice-chairmen were C. B. Laird, Eagle Iron Works, Des Moines, Iowa; R. P. Mc-Kendrick, Blaw-Knox Division, Pittsburgh, Penn.; and J. C. McLanahan, McLanahan and Stone Co., Hollidaysburg, Penn. W. Neil Richardson, The Universal Engineering Corp., Cedar Rapids, Iowa, was elected to the board of directors. Re-elected to the board were J. B. Bond, Nordberg Manufacturing Co., Milwaukee, Wis.; Emil Deister, Jr., Deister Machine Co., Fort Wayne, Ind.; John E. Dunn, Allis-Chalmers Manufacturing Co., Milwaukee, Wis.; W. A. Rundquist, Pioneer Engineering Works, Minneapolis, Minn.; E. D. Stearns, Barber-Greene Co., Aurora, Ill.; Austin K. Thomas, Chain Belt Co., Milwaukee, Wis.; and Roy Wills, Lima-Shovel & Crane Div., Baldwin-Lima-Hamilton Corp., Lima, Ohio.

Messrs. Heuston, Ketner and Johnson represent the Division on the board of directors of N.S.G.A.

#### Ladies Entertainment

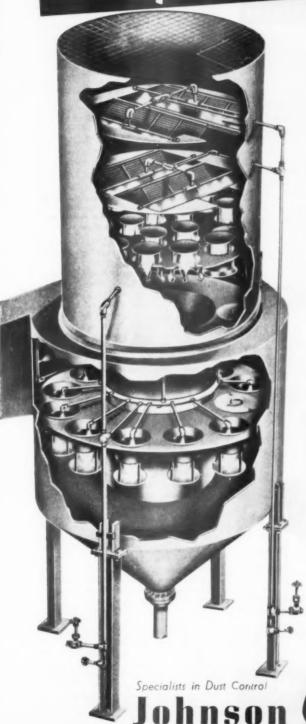
Entertainment features were arranged to appeal particularly to the ladies, who were guests on two separate occasions of the Rock, Sand and Gravel Producers Association of Northern California and the Northern Ready Mixed Concrete and Materials Association. One of these events consisted of a luncheon at the Palace Hotel where Paul Speigle, raconteur, spoke on the subject "I Love San Francisco." The luncheon was followed by a planned tour of outstanding attractions of the area.

The ladies were again guests of the two associations at the St. Francis Hotel where coffee and sweet rolls were served. A representative of the San Francisco Convention and Visitors Bureau described the outstanding shops after which the ladies were escorted to the stores of their choice. Tours to Stanford University and other locations were also arranged.

#### State Cement Plant?

A BILL, recently introduced into the North Dakota State Legislature, calling for a \$5,000,000 bond issue for the establishment of a state-owned cement plant, has been temporarily killed. The measure was indefinitely postponed by a vote of 28 to 21.

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• Six different principles incorporated into a single unit make the Johnson-March "LP" Multiple-Action Scrubber the most efficient yet developed for removing dust from stack discharged gases. "LP" Scrubbers are particularly adapted to the control of dust in asphalt plants, limestone plants and wherever stack dust is a problem.

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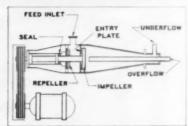
#### A.I.M.M.E. Meeting

(Continued from page 146)

and 24.5 percent for all runs except Run 119.

A detailed study of these data may point to a method of recovering agstone from wash waters in processing plants, and to a cheap method of getting sand gradations.

Philip G. McGuire, Oliver-United Filters, Inc., read a paper on "The Centricione in Specific Metallurgical Applications." This paper is of particular interest to the portland cement industry, those doing wet-fine



Details of Centriclone liquid classifler which has been used effectively for the recovery of fines. It is usually operated in a vertical position with the belt drive at the top

grinding by ball or rod mills, or for the separation of coarser solids from a thick (or thin) pulp.

The speaker described the essential elements of the centriclone as a liquid cyclone to make separations based on particle size and can also be based on particle specific gravity. In liquid cyclone operation, the viscosity of the fluid has an important effect on separations. In most cases the viscosity is due to the presence of high percentages of suspended solids.

The conventional type liquid cyclone (Whirlicones, Dorrelones, Triclones, etc.) has been used for a few years. The centriclone has been developed in the last two or three years and has certain fundamental differences from other liquid cyclones.

He pointed out that the usual design of liquid cyclone includes a tangential feed inlet into the upper part of the body through an orifice that is of controlled size. The feed introduced under pressure produces the circular velocity or spin to accomplish the desired separation. The undersize or fine particles are taken off from the center of the upper body through an overflow outlet. The oversize or coarse particles are taken from the apex of the cone that forms the lower body through an underflow outlet.

The speaker said that the centrifugal forces that are available in this type of unit vary directly with the inlet pressure and velocity at the feed orifice and vary inversely with the radius or diameter of the cyclone body. Therefore, when high centrifugal force is required for separation this type of liquid cyclone must be small in diameter and consequently have a low internal volume. The prac-

(Continued on page 182)



# **OTHER** WILLIAMS EQUIPMENT



### ROLLER MILLS

-IMPACT and DRYER MILLS -for fine grinding to 400 mesh or micron sizes

any type; for precision control and high production in fine grinding



in any size for any job.

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Also: COMPLETE "Packaged" PLANTS for crushing, grinding, separating.

With a Williams, you don't need a primary crusher and another two or more secondary grinders - because a single Williams Hammer Mill does the complete job in one operation!

That means no additional machines are necessary - no extra foundations, housing, conveyors, drives or other equipment - a saving up to 75% on initial investment! And because a Williams does the job faster and better, you can cut your crushing costs up to 50%!

There's a Williams to suit your specific need, no matter what it is! It will pay you to get the facts now!

### TYPICAL WILLIAMS HAMMER MILLS AND WHAT THEY CAN DO

SUPER-SLUGGER

Crushes power-shovel-loaded stone to 11/2", 3/4" - even to 8 mesh -- in one operation! Capacities up to 550 tons per hour.

SLUGGER

Reduces 100-pound stone to 11/2", 3/4" or agstone — in one operation! Capacities up to 100 tons per hour.

NF and GA TYPES Reduce 4" stone to 1/2", agstone — or as fine as 20 mesh in one operation! Capacities up to 200 tons per hour.

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OLDEST AND LARGEST MANUFACTURER OF HAMMER MILLS IN THE WORLD

# WHY NOT LOAD THE CHEAPEST WAY?



# FIGURE CONSIDER COMPARE AND SEE

A B-G 82-A Bucket Loader is by all odds the cheapest and fastest method of loading free-flowing materials into trucks. Exhaustive cost analyses made throughout Barber-Greene's over 30 years' experience (during which B-G Loaders handled over a billion yards of material) have consistently proved this.

In addition, the B-G Constant Flow principle of loading eliminates cycle loading shocks . . . loader is easier to keep in adjustment, cheaper to maintain. Simple controls mean that each

driver can load his own truck . . . no need for an expensive operator. Each truck can be loaded to full capacity without spillage . . . without truck damage or undue truck wear. Crawler-mounted, the 82-A provides positive traction in all kinds of going—on soft or muddy bases—on spots where pneumatic-tired rigs can't operate.

All this means that when you need a B-G 82-A Loader, you can't afford to be without one . . . ask for complete details.

see your B-G distributor

# ...ON JOBS LIKE THESE

# STOCK PILE LOADING

Here's the most economical, and fastest, way to load bulk materials from stock pile to truck. No backing up, no swinging around, no lost motion whatever—the 82-A steadily eats into the pile, cleaning up as it goes—at less cost per yard than is possible with any other machine or method.



# to the

# TOPSOIL STRIPPING

Stripping topsoil and loading directly to trucks is another fast, low-cost operation for the 82-A. Special notched topsoil spirals pulverize and "fluff-up" the soil . . . lumps are broken up to give every load the quality of rich, black loam. Close control of grade allows stripping all the topsoil down to the subsoil. This close grade control makes the 82-A especially suited to stripping jobs such as dump areas, park paths, highway dividing strips, etc.

# BANK LOADING

Your truck fleet will be constantly on the move keeping up with the 3 cu. yd. per min. loading rate of the 82-A as it works the face of a tough gravel bank. It can be equipped with a double-deck vibrating screen to deliver sized aggregate to one truck and scalp oversize to another . . . making screening and loading a simple, simultaneous operation. Close grade control and cleanup scraper leave a clean, level floor.



# AND MANY OTHER COST-CUTTING JOBS

WHATEVER

the bulk material . . . sand, stone, gravel, coal, ashes, bulk chemicals . . . the B-G Loader will load into trucks faster, at lower cost. And a variety of screening attachments, boom extensions and spouts assures the easy adaptation of the 82-A to all your loading jobs.

WHEREVER

your loading operations may be, the wide, long crawlers on the B-G 82-A provide the necessary traction for working on all soft, muddy bases. This means more workable days per season, every season.

WHENEVER

you want to save as much as 60% of all truck time compared with intermittent dig and swing loading—

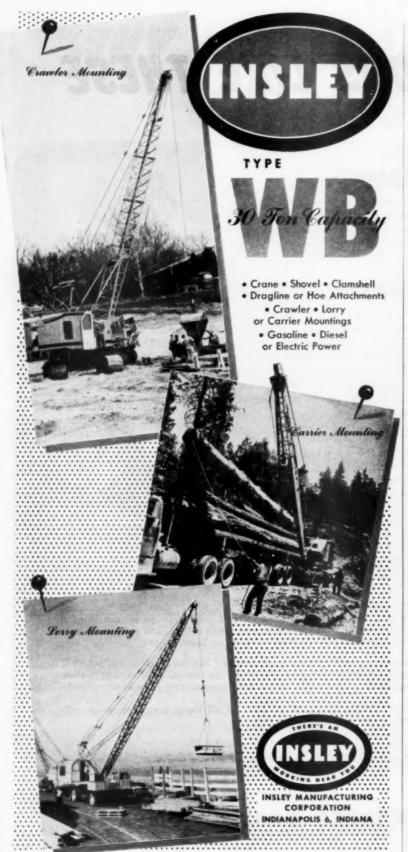
YOU MEED

the Barber-Greene Crawler-Mounted Model 82-A Bucket Loader.

or write

BARBER-GREENE COMPANY

AURORA, ILLINOIS



# A.I.M.M.E. Meeting

(Continued from page 178)

tical operating range is close to 50 f.p.s. maximum velocity, usually in the 10-30 f.p.s. range.

He amplified his paper, saying the centriclone is designed with a feed inlet into the upper body that is not tangential and has no orifice. The feed pressure can be optional because this has no effect on the circular velocity. An annular opening from the upper body leads the feed to a power driven impeller with radial vanes on the feed inlet side and this impeller produces the circular velocity or spin to accomplish the desired separation. The undersize or fine particles are taken off from the upper center of the cone a short distance from the back or smooth side of the impeller. This overflow is taken through an outlet tube that passes through the center of the cone and emerges at the center of the cone apex connection. The oversize or coarse particles are taken off through an underflow outlet that is on the side of the cone apex connec-

He pointed out that the centrifugal forces that are available in this type of unit vary directly with the radius or diameter of the impeller. The diameter of the centriclone can be selected to give an internal volume or time of particle residence independent of other conditions. The practical operating range in use so far is close to 100 f.p.s. maximum velocity or about 800 Gs (times gravity) obtained at the impeller periphery.

The classification of a grinding mill discharge without dilution can be accomplished by utilizing the centricione features of controlled velocity and controlled residence time, the speaker indicated. In cases where classification of thick pulps is necessary or where dilution and rethickening are not desirable, the unit may offer a practical answer in many cases.

The speaker said that on pulps of any viscosity where an exceptionally clean product is required, the use of two centriclones in series with dilution of the feed to the second unit can give a very sharp separation with respect to both oversize and undersize.

In the discussion that followed, F. B. Sheets and Horace S. Moore of the Southwestern Portland Cement Co. told of the use of 20-in. centriclones in the portland cement grinding operations. The units are in use at the Victorville, Calif., plant where three 7- x 26-ft. Allis-Chalmers and one 7- x 14-ft. Allis-Chalmers ball mills are operated. The mills, before using the centriclones, ground 120 t.p.h. in open circuit and now grind 132 t.p.h. in closed circuit with centriclones.

In reply to a question by Fred C. Bond, Allis-Chalmers Manufacturing Co., it was brought out that the feed to the ball mills was about 64 percent solids and that roughly 66 percent of the total feed was returned to the ball mill for re-grinding.



Illustrated is Versicon—one of Thermoid's "Basic Five". A true allpurpose hose for handling air, water, oil or welding gases.

# When you are in need of hose— Suggest you look at Thermoid!

See how extra strength is built into each length—with either tough rayon cords or special cotton fabric. Abrasive resistant—light—easily handled—resists kinking—designed for maximum service. Whether it be one of Thermoid's multiple service types or a hose designed for a specific use, your Thermoid Distributor can recommend the type best suited for your particular requirements.

Call your Thermoid Distributor. He has complete information on all types of Thermoid Hose and other Thermoid products. Our experienced Sales

Engineers are available for help with unusual problems.





It will pay you to specify Thermoid.

Conveyor & Elevator Belting • Transmission Belting
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Used by leading quarries for economical secondary breakage.

2000 to 8000 lbs.

Prompt Shipments

For further information write-

Cape Ann Anchor & Forge Co.

Post Office Box 360 Gloucester, Mass.

# **Agstone Selling Job**

(Continued from page 123)

cash crops, giving no thought to the future preservation of the soil."

"Our chief problem in selling agricultural limestone is that many farmers feel their soil is rich and does not need limestone. Many will not even consider testing soil to determine what it may need."

"Offhand, I should say that the big trouble with the agricultural limestone industry is that there aren't enough salesmen in it."

"The chief obstacle in selling agricultural limestone is the idea that has been developed in the minds of farmers over the past years that a ton or two per acre at seeding time is all that is necessary until the next seeding. The farmer compares the cost per ton for cash agstone to PMA agstone and refuses to buy extra agstone even though it would pay him big dividends. To overcome these obstacles, more emphasis must be placed on education. Agricultural limestone should be classified as a capital investment, the same as a tractor, and sufficient amounts applied to satisfy soil requirements without delay. This can be done very easily where interest rates are not too high for two or three year loans."

"The chief obstacle to selling agricultural limestone is the fact that all of the producers are selling it too cheaply. Because of this and the low profit derived, there is little or no room for advertising budgets. If agricultural limestone could be put on a higher level, demanding higher prices, each company could increase its advertising budget sufficiently to put its story over."

"Within recent months in the Oklahoma area the government red tape involved in securing government financial assistance in placing agricultural limestone has become increasingly burdensome and there is much resentment among farmers. A complicated method of testing all soils has been established and the farmers must abide by the government officials' decisions as to whether or not a farmer is to receive agricultural limestone with the government participating in the cost. The Production and Marketing Administration in Oklahoma also adheres rigidly to the specifications for agricultural limestone and if a particular car load of this material fails to meet specifications, they very promptly assess a penalty charge against the seller of the agricultural limestone, such penalty being based on the cost of the material when spread. This is very discouraging to spreaders and sellers of agricultural limestone. It would expedite the sale of agricultural limestone if the Production and Marketing Administration would make their test at the plant of the producer of the agricultural limestone and either approve or reject a carload of agricultural limestone before it is shipped."

"The stigma resulting from poor quality material and the natural effect of widespread comments about 'my poor material,' among farmers, is the biggest obstacle. Also, the 'over the fence' talk among farmers about poor jobs of spreading agstone is another big obstacle. Not having a fine reputation as an agstone producer and dealer is the biggest obstacle."

"Some years ago Iowa operated largely on the contract system rather than cash sales or purchase orders. In those days the successful bidder in a county or group of townships had a reasonable expectation as to the tonnage that could be sold during the year and could speculate, without too great a hazard, as to the tons that could be manufactured and stockpiled for this annual market. At that time county committees were very aggressive in signing up and writing orders for the producer around the first of the year. These were turned over to the producer and the producer could then go to the farmer and ask him when he wanted the material he had ordered, rather than did he want the material. There is a tremendous difference in this approach to the farmer, and the sales problem to the producer was minimized.

"In the last few years the lowa trend has been away from the contract system of sales to the purchase order system. This has increased the hazard of agricultural limestone production, as such, to the producer in that there has been no reasonable assurance of any expected tonnage regardless of any acceptable fair price. Along with this trend there has been an increasing number of producers with the corresponding increase of competition. This has realistically lowered an already low plant price for agricultural limestone. The low margin of potential profit in this low priced commodity does not permit the development of a direct sales organization. Many producers, therefore, have elected to compete for trucker and distributor business through a lower plant price without a sales organization rather than a higher price with a sales organization. Other producers have been forced to make a minimum amount of agricultural limestone while increasing other crushed stone products that are less hazardous and have a greater market. I mean roadstone, in particular.'

### **Government Appropriations**

Our letter survey was unanimous that the agricultural limestone indus-

(Continued on page 187)



# Here both in

THE SAME BOAT!

What should a Dredge Pump User expect from the Manufacturer?

Just what are the obligations of a Manufacturer to his Customer? On this point, we at Thomas Foundries have a very definite policy.

We implicitly believe in the famous proverb of modern business that "the priceless ingredient of a product is the honor and integrity of him who makes it".

In obedience to that principle, we build the best pumps for Dredging and for Sand and Gravel that we know how to build. Sound engineering. Modern materials. But further than that—is our obligation to render SERVICE to our customers through the years.

SERVICE: Quick, dependable shipment of parts, when needed. No delays.

PARTS: Accurately made of highest quality materials. Complete stock of parts maintained for immediate shipment.

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This service policy partly stems from selfish motives. We and our Customers are in the same boat. We believe that what helps our Customers helps us.



The Customers need efficient pumping and dependable services. Thomas Foundries needs satisfied Customers—pump users. This happy combination—first class product plus a sensible sales and service policy—is getting results. It is adding numerous new and "repeat orders", Pump Customers.

One, who has just bought his second Thomas Pump recently wrote us, "those who don't use Thomas Pumps don't know what they're missing". If you think you would like some of this kind of service, write to THOMAS FOUNDRIES, INC., P. O. BOX 1111, East Birmingham 1, Alabama.



Substantial savings are realized by cement mill operators using ABK Metal liners in primary, secondary or tertiary compartments for wet or dry grinding of raw stone or finished product.

Extended liner life of as high as 3 or 4 times can be expected when ABK Metal replaces ordinary iron liners. That's because of the extreme hardness (500 to 700 Brinell, as required)

and very high resistance to abrasion that is characteristic of every ABK Metal casting. A nickel-chrome iron of controlled structure, ABK Metal is produced only by Brake Shoe.

Why let abrasion steal your operating dollars. Specify ABK Metal castings...cut your replacement, maintenance and downtime costs and increase your grinding mills' efficiency.

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BRAKE SHOE AND CASTINGS DIVISION

230 Park Avenue, New York 17, N.Y.

**Agstone Selling Job** 

(Continued from page 184)
try as a whole would immediately
suffer a substantial loss in volume
of business if soil conservation appropriations be cut considerably or be
eliminated. While this prediction was
unanimous, it was not the forecast
for some individual companies which
are those that, for many years, have
merchandized on a high plane and
had not relied on subsidies and outside agencies to do their selling for
them.

Estimates of the extent of the drop in volume ranged from a low of 10 to 25 percent depending upon whether or not farm prices be trending up or down, to 50 percent or more. It was predicted that the reduction in volume might be as high as 95 percent throughout eight southern states and that, in one Great Plains State, the industry's business would be completely wiped out. Average for all predictions was in the range of 40 to 50 percent, based on our sample. These figures were based on the premise that there would be no soil conservation payments. Other predictions were that the immediate reduction in business would be roughly proportionate to the extent of a cut in appropriations.

The level of farm income would have heavy bearing, as some producers pointed out, because farmers usually have a tendency to cut soil conservation first when pressed for funds. Many producers would expect an immediate dip in business and believe appropriations to be essential but there were also a considerable number who expressed optimism that volume of sales might gradually be recovered after a long pull, provided there is no recession. There were a few who believe that the loss of farm income resulting from a discontinuance of soil conservation practices would show the value of liming to the farmer and that he then would resume the practice. One producer said that any substantial cut in the appropriation would result in 75 percent of the truckers or dealers in his area not having enough volume to stay in business and that spreader service would thus be eliminated.

Some of the comments on the matter of appropriations were as follows:

Okla: "I think if government A.C.P. appropriations are eliminated the use of agricultural limestone will be reduced 95 percent in the state of Oklahoma, and I believe it will be the same in the eight southern states composed of Oklahoma, Texas, Arkansas, Louisiana, Mississippi, Alabama, Georgia and South Carolina. I think the industry as a whole will lose 75 percent of its entire agricultural limestone sales if the appropriations are eliminated and if they are only reduced the sales will be reduced the same percentage as the appropriation is reduced."

Ohio: "I am positive that reduction or complete elimination of soil conser-



If you've had occasion to use a round-nose hand shovel you'll understand why—

An Owen Round-Nose Bucket is uncommonly efficient in handling rock and broken slag and in exceptionally hard excavating and dredging operations.

As compared to a straight-nose shovel, the roundnose penetrates hard earth more readily—"noses" its way into broken rock with less effort—and consistently comes up with a "bigger load." And like an egg it is stronger due to its curved surface.

In the Owen line is a bucket for every specialized and general digging and rehandling purpose.





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UNIVERSAL VIBRATING SCREEN CO.

RACINE -- WISCONSIN

vation appropriations would have a very decided effect. This was proven a few years ago when all PMA payments were stopped. I am quite sure that the business over a long pull could be built back, to approximately its present day worth. Of course, the farmer's net income for the next several years will have much to say about this. It is the history, at least of our local farmers, that when prices go down and costs stay high, that one of the first things they cut down upon is soil conservation, which means the use of agstone."

Va.: "We do not think the elimination of soil conservation appropriations would affect our business to any great extent in the long run."

Ohio: "It is my opinion that if appropriations were eliminated that there would be a temporary decline in the use of limestone due to the fact that a great many farmers now enjoying partial government assistance have not fully appreciated the benefits of soil practices, but through contined education in soil conservation that if the economic aspect were proven that a loss of income be substantiated by this circumstance the merit would then be re-established. This would be a challenge to selling education technique."

Fla.: "My personal opinion is that the government has received as much or more value for the dollars it has expended for soil conservation practices than for most any other program it has undertaken. I further feel that it would be false economy if this program is reduced materially or entirely eliminated. However, despite PMA, I believe that the future of the agricultural limestone business in our territory will work out to a point where the use of iimestone will increase from year to year. There might be a lag for a year or two if federal aid is eliminated or materially reduced, but as stated above, I think that can be overcome by proper and intensive sales promotion.

Penn.: "I feel there will be a definite and decisive drop in the tonnage of limestone sold. My reason for this belief is that the Production and Marketing Administration is and has been doing our job of selling. If we get busy and go after the business, we can head off a large percentage of this tonnage and in a few years go ahead, if we do not have a serious recession."

Ohio: "There is no question in my mind that, if soil conservation appropriations are reduced, or eliminated, that we will sell less material I do not believe that we will feel the effects since we have a dealer organization, as much as those companies which do not have and have been de-



. SHOT IS FIRED IN COYOTE TUNNEL AT MOUNTAINSIDE QUARRY.

# More than a million tons of well-broken rock produced by huge "NITRAMON" quarry blast

Up to 1,500,000 tons of well-broken stone were produced when the largest commercial blast ever witnessed on the West Coast took place last summer. The blast contained 372,298 pounds of Du Pont "Nitramon" in a 1000-foot coyote-tunnel layout at the Corona, Calif., quarry operated by the Minnesota Mining and Manufacturing Company.

Large coyote shots are an ideal method of blasting these extensive deposits of dacite porphyry. The rock is used in the production of roofing granules, and excellent breakage is required for best efficiency. "Nitramon" has

been continuously used in primary blasting since this quarry operation began.

"Nitramon" is ideal for jobs of this type. It's the safest blasting agent known. It can't be detonated with ordinary blasting caps, by fire, friction or sudden impact of falling objects. Still . . . a "Nitramon" Primer (itself relatively insensitive) dependably detonates every charge. Packed in watertight containers, "Nitramon" can be loaded far in advance of firing. In addition, its safety features allow stringing regular lighting lines into coyote

tunnels... materially speeding up the job of loading.

Whenever you're planning coyote-tunnel or large-diameter blast-hole shots... you can be sure of maximum safety and better breakage by using Du Pont "Nitramon." Its superior safety, convenience and economy explain why quarry owners and operators from coast to coast heartily endorse it. The Du Pont Explosives representative in your district will gladly give you complete information. E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Del.

RESULT SHOWS EXCELLENT BREAKAGE OF ROCK
REQUIRING MINIMUM OF SECONDARY BLASTING

# **DU PONT "NITRAMON"**

A Product of Du Pont Explosives Research



BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

\*Reg. trade-mark for nitrocarbonitrate blasting agent



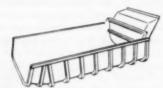
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MODEL 310: Scoop end mucker body for use with St.Paul Hi-Dumper hoists. Extra pay-lead capacity, dumping angles up to 75°.



MODEL 311: Heavy-duty racktype body with scoop end for fast, easy dumping of big payloads on mine or quarry operations. There's a "difference" in dump bodies! And St.Paul proves it, with this completely new heavy-duty line, newly engineered for extra payload hours. Note the sturdy 3-way reinforced box channel tail gate on the new St.Paul contractor's body, (shown above). It's built stronger, tougher, to withstand roughest usage, without warping or binding. Improved design of offset upper hinges and recessed lower hinges also means added hours of smooth, trouble-free operation on your job.

And look at those massive boxed steel side braces, with double-rolled top flanges and full-length rub-rails! They're plenty rugged! In addition, you get rigid boxed corner posts with unitized, "sagproof" subframe for extra-long service. Call your truck dealer, or St.Paul Distributor today for full details on sizes, styles, etc. to fit your needs. St.Paul Hydraulic Hoist Customer Service Dept. 36123 Main St., Wayne, Mich.

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Hoists
Dump Bodies
Refuse Loaders

**Agstone Selling Job** 

pendent entirely upon getting their orders from the P.M.A. It seems to be that companies which find themselves in this predicament have no one to blame but themselves, but I know that they will scream the loudest and some might be forced out of business or have to change to making roadstone and other products."

Tenn .: "If the soil conservation appropriations are reduced or completely eliminated by the federal government, I believe this will cut the use of agricultural limestone by at least 50 percent, and only through a concerted selling program will we be able to gradually increase this to around the tonnage now being sold. In other words, my belief in the matter is that when the government eliminates its help, a number of farmers will immediately feel that they are not able to buy agricultural limestone. and only through a good selling job will they resume buying.

"One of the difficulties we have run into has been the method employed by PMA in handling agricultural limestone. When they award it on a contract basis, frequently an irresponsible trucker gets the contract and even though we, the producers, try to watch his credit very closely, during the busy season the first thing we know is that he owes us a lot of money. And although he has possibly been paying us regularly for a while, he gradually gets into financial difficulties and the producer eventually loses some money through this bad account. We have had this experience, even though we try very hard to watch our credit business. Some of the counties in Tennessee are now using the purchase order plan, which allows the farmer to buy from any dealer or producer he so desires, and this has helped our local credit situation, but we are still experiencing difficulty in Alabama in collecting from the truckers who act as dealers."

Kans .: "We are certain that if the subsidy appropriations were reduced or eliminated, the sale of agricultural limestone would be practically nonexistent. We have ample justification for this supposition in two instances. First, in 1948 when the Republican Congress refused to make the appropriations for about 60 days, we did not sell a single pound of agstone in the 16 counties in which we then operated. Again in August, 1952, our state committee ran out of funds and we sold less than 500 tons of agricultural limestone during the rest of the year in the 21 counties we were serving, which prior to that time had bought more than 50,000 tons in four

"If the present administration succeeds in eliminating the payment practices on agricultural limestone and fertilizers, it is now our inten-

tion to liquidate our operation as we feel that the business of production of crushed stone with the sale of agricultural limestone as a by-product, on a cash basis, cannot be successfully carried on."

lowa: "If soil conservation appropriations are reduced it will reduce sales of limestone to some extent. Many farmers are wise to the use of limestone and will continue to use it. The amount sales will be reduced depends upon the general area and the need for limestone. It will also depend on the farmer's income. If he gets a good return for his products he will put some of his profit back in the soil. If his income is low he is going to eat first."

Ohio: "If the P.M.A. appropriation for agricultural limestone as conservation material be limited or discontinued entirely, it would doubtless seriously affect the industry total tonnage. We doubt that our company will lose tonnage at anything like the rate applicable to the industry."

N.Y.: "If soil conservation appropriations were reduced, the tonnage shipped would naturally go down until the fact that agstone is the number one item necessary for successful farming is realized. That I believe would hold true for the entire industry. There may be exceptions where most of the agstone used has been under the purchase order plan for the last three or four years."

Minn.: "If soil conservation payments are eliminated, I expect our sales to drop to about one-half of what they have been."

Wis.: This producer took issue with the stand of Secretary Benson as follows:

"I personally believe that the conservation of the fertility of the soil is a must if this country is to eat and survive with the ever increasing population, and it is the problem of all the people and not just the farmer and his family who although owners, in our way of thinking, are nothing more than trustees of the soil which must continue to feed the generations to come. I don't believe the Secretary of Agriculture has thought deeply enough when he classifies the measly \$250,000,000 per year which has been given to help keep up soil fertility as a hand-out or a subsidy. Call this a subsidy if you will, but when you do, then remember that every method of transportation that has ever been used in this country has been subsidized because it was considered for the best interests of all the people-railroads, steamship lines, air lines, the post office department, and any new development along that line. And now we have appropriations by the government to

# For better performance in **HEAVY-DUTY HOISTS**



# NOW stress-proved and WORK-RATED for lowest cost per payload hour

You profit two ways by choosing
St.Paul for heavy-duty hoist installations: [1]
NEW stress-proved design (with 50 advanced improvements) assures better all-around hoist performance. (2) NEW conservative ratings—based on practical field experience—mean St.Paul hoists deliver every ounce of capacity shown in the ratings, with plenty to spare!

Consequently, more and more St.Paul users are finding that they can haul consistently full payloads for more hours, with substantial savings in down-time and hoist maintenance—doubly important in heavy-duty operations!

For convincing proof, see your St.Paul Distributor. Or, better still, equip several of your trucks with new St.Paul heavy-duty hoists and let your cost records speak for themselves! St.Paul Hydraulic Hoist, Customer Service Dept. 36123 Main St., Wayne, Michigan.



New silding tension bars absorb shock loads, avoid danger of cracking side rails or chassis frame.



New equi-lift strut arms equalize stresses, prevent binding or buckling from uneven load conditions.





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When it comes to really rough screening jobs . . . the screening of damp lime, ag-lime and silica sand at fine mesh . . . the most satisfactory results are obtained by using a Leahy Screen equipped with FlexElex Electric Heating of the screen jacket.

FlexElex keeps the screen wires heated and dry, the mesh remains wide open and you get full capacity production for days and weeks on end.

In addition, the Leahy screen has differential snap action that dislodges intermediate size wedging particles, utilizing an exclusive vibration principle provided by no other screening equipment. The net result is economy that pays for FlexElex in less than a year's time . . . while your profits enhance as well.

Send for Bulletin 15-J.



The Original Deister Company, Incorporated 1906
915 Glasgow Avenue, Fort Wayne, Indiana





# Agstone Selling Job

(Continued from page 191)

private companies, which is as it should be, to promote the development of various new projects. Is conservation of soil fertility less important?

"Subsidy is perhaps the wrong word. Let us think of it in another light. Many industries receive depletion allowances along with depreciation. Should there not be some allowance in some form, not to compensate for the fertility of the soil that has been used up, but to contribute to keeping the fertility up to its original standard?

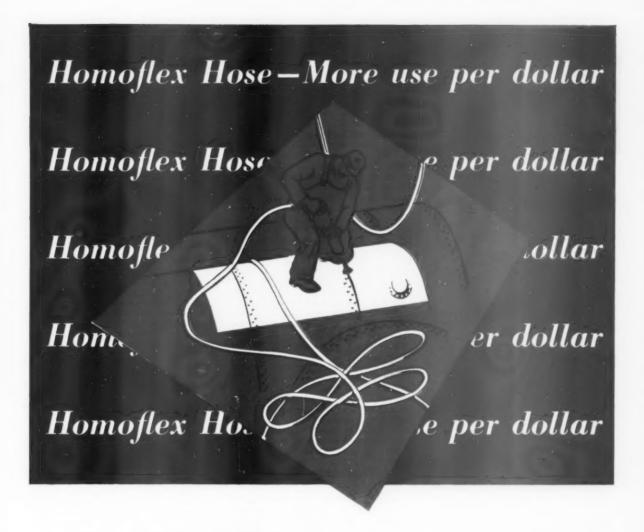
"When we think of the fact that this government has squandered billions in foreign gifts and hand-outs and actually spent more money on foreign agriculture than on our own, we wonder just where the American people rate in importance when it comes to reaping the benefits of the taxes they pay."

III .: "If appropriation is reduced or eliminated, the subsequent loss of business will vary according to the economic location of the producer. In most areas agricultural limestone is generally accepted by most prosperous farmers. However, if the fund is eliminated while farm prices are declining, the two factors together will reduce business at least 25 percent. If eliminated while prices are at a good level, the decrease will be very nominal or probably less than 10 percent. In other words, our company feels that the declining farm prices are as much or more a factor than the elimination of the payment for application."

Okla.: "If soil conservation appropriations are materially reduced, we would expect that the sale of agricultural limestone in this area would drop considerably, at least temporarily, but since many farmers are already convinced of the value of soil improvement by the use of agricultural limestone we believe that some agricultural limestone would continue to be purchased by the farmers although on a much reduced scale.

"It is our opinion that government aid will continue to be necessary if the agricultural limestone program is to continue to maintain a progressive advancement. This program in turn would be much more effective if the government could eliminate some of the red tape associated with the handling of government assistance to the farmers."

lowa: "It was demonstrated a few years ago, during the holiday on conservation payments, that without assistance the agricultural limestone business in many places dropped to zero. If payments had been eliminated permanently, there would have been some recovery or leveling off; but in my humble opinion, the recovery of



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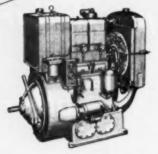




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this market would have been relatively small.

"With an increase of 2 million plus mouths to feed every year in these United States, if we are to maintain an increased fertility the farmer must follow good conservation practices. A few of them will do this. A great majority of them will not. It therefore becomes the responsibility of the Department of Agriculture or the states to see that this is done. One method is to 'force' conservation practices by means of a good incentive payment program. This will of course mean a high Department of Agriculture budget for agricultural limestone and other permanent conservation practices. The bad feature of this is that the progressive farmer following good practices, regardless of an incentive payment program, will get a 'free ride.' Such a program, however, would help to assure a maintenance in some degree of our nation's fertility. Possibly at some time in the distant future the conservation program will stand on its own feet.

"I have not meant to imply that the limestone industry can or should sit idly by and let 'George' do it. On the other hand, much stronger leadership from the federal and/or state governments will be necessary to thoroughly educate the farmer. At such time as all farmers recognize the true value of agricultural limestone and follow good conservation practices, then producers will be forced to follow an aggressive sales program, selling competitively, quality and service."

### **Slate Production**

DOMESTIC PRODUCTION OF SLATE in 1951 totaled 825,700 short tons, valued at \$13,895,711, as reported by the Bureau of Mines. This was a decline of 11 percent in quantity and 8 percent in value. The decline was primarily in sales of granules and flour.

Sales of roofing slate amounted to 205,120 squares, valued at \$4,357,412, compared with 197,570 squares, valued at \$4,098,842 in 1950. The average value per square in 1951 was \$21.24, an increase of \$0.49 per square over 1950. Gains were confined, however, to Pennsylvania operations; sales in other regions declined. Mill-stock sales declined slightly in quantity and value from the record high of 1950. The principal decline was in sales of blackboards and bulletin boards. Sales of flagstone declined 1 percent in quantity but gained 13 percent in value. Production of granules and flour totaled 654,550 short tons, valued at \$5,881,001, which was a decline of 14 percent in quantity and 21 percent in value.

There were 77 slate producers in 1951, a decrease of 17 from the previous year. They were distributed by states as follows: 25 in Pennsylvania; 22 in Vermont; 19 in New York; five in Virginia; two in California; and one each in Arkansas, Georgia, Maine and Maryland.

# **Agricultural Limestone**

(Continued from page 131)

medium to sell it for you; get out and sell it yourself. Sales mediums, like good salesmen, have a tendency to sell themselves first and the product second. Government programs are certainly no exception to the rule. Politicians have more of an inclination to play up the angle that there is being offered "something for nothing," than they have to expound the virtues of the material or service that is being offered. And don't forget to sell a "complete program" of production efficiency, so that your product can have a fair and unhampered opportunity to deliver its maximum benefits.

# **Foreign Cement Production**

ANGOLA: The new portland cement plant at Lobito has started operations on an experimental basis. Initial production, estimated at 90,000 tons annually, was destined for construction of the Biopio hydroelectric project. Expenditures through 1951 on plant and equipment totaled approximately \$2,800,000.

PHILIPPINES: Cement production totaled 1,850,927 bbl. in 1951, compared with 1,749,637 bbl. in 1950. Production was divided between Cebu Portland Cement Co., Inc., and Rizal Cement Co., which produced 5,586,364 and 1,500,000 bags of cement, respectively. Approximately 220,000 bags of cement were imported from Japan during the heavy construction season. The directors of Cebu Portland Cement Co. recently opened bids for machinery and equipment for a new cement plant to be constructed at one of several sites now under consideration. The new plant will have a capacity of 6000 bags daily, to supplement current capacity of the Cebu plant (20,000 bags daily). Cost of the new plant will be about 10,000,000 pesos.

SPAIN: Production of portland and natural cement in 1951 totaled about 2,741,000 metric tons, compared with 2,172,000 tons in 1950. As concrete is used in Spanish construction wherever feasible and virtually none is exported or imported, the production figures represent consumption. A large housing deficit has existed for many years. Requirements for cement were much greater in 1951 than in 1950 for both private and government projects.

WESTERN GERMANY: Production of cement totaled 12,151,000 metric tons in 1951. During the fourth quarter, production increased during October, decreased slightly in November, but dropped sharply in December to below the 1950 monthly average. To overcome the coal shortage, several cement plants have converted their plants to oil, while others augmented coal supplies with imported American coal.

These reports were taken from the August, 1952, issue of Mineral Trade Notes, published by the Bureau of Mines.



# 8 months extra service with the right brick!

THE superiority of Permanente Periclase-Chrome brick—the brick on the right—is demonstrated by its performance in rotary cement kilns in five plants selected at random from our customer list.

The brick on the left, previously used in the hot zone linings, gave approximately 2 months average service. With Permanente Periclase-Chrome brick, the average service jumped to 10 months!

This eight months extra service increased annual capacity an average of 12,935 barrels per kiln. Annual net profits went up an average of \$3,880. In addition, important savings were realized through reduced cost of materials for relining.

Whatever your current kiln capacity, it probably can be increased with Permanente Periclase-Chrome brick, because they are especially designed for hot zone linings. If an appraisal of your kiln performance would be helpful, Kaiser Chemicals will be glad to work with you.

SEND FOR BOOKLET giving installation procedures and for literature explaining all the advantages of Permanente Periclose-Chrome bricks. Standard brick sizes available, both burned and chemically bonded. Installation service at no extra cost. Complete facilities insure superior service. Call or write principal sales offices: Chemical Division, Koiser Aluminum & Chemical Sales, Inc., 1924 Broadway, Oakland 12, California. First National Tower, Akron 8, Ohio.

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P&H offers you the only 2-cycle diesels with this outstanding feature. Yet, it's only one of many advantages you'll find in this advanced P&H line . . . with 1, 2, 3, 4 and 6-cylinder models — from 20 to 138 h.p. Ask your P&H Diesel representative for full details. Or write us.

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# INFORMATION

You can obtain catalogs listed on these pages by merely checking and mailing the coupon below

# TO HELP YOU MEET TODAY'S PROBLEMS AND TO MAKE PLANS FOR TOMORROW

- ARC WELDING—Hobart Brothers Co. has released Vol. IX, No. 3, of its Arc Welding News. The booklet features an article on bridge building in Korea. Various arc welders are illustrated in full color.
- ASPHALT FLANTS Standard Steel Corp. has announced a brochure No. 525 which describes the improvements and special features of the RB Series of standard asphalt plants. Design features are detailed and constructional improvements are discussed.
- BLOCK MACHINES—Lith-I-Bar Co. has released two sheets on its Lith-I-Block machine. One presents tips, hints, little-known facts, etc., about machines, markets and products. The other describes the various attachments available to machine owners.
- BURNER—National Airoil Burner Co., Inc., has released bulletin 25 on its dual-stage oil burners. A detailed description of the burner and its uses, along with specifications is includsed.
- CONCRETE DENSIFIER—Sika Chemical Corp. has published a booklet, "Plastiment Concrete Densifer," discussing uniformity, crack resistance, water tightness, and surface hardness results through the use of Plastiment. Engineering information, drawings, tests and illustrated job applications are included.
- CONCRETE HAULAGE Maxon Construction Co., Inc., has issued Form I-116 which describes its truck body for hauling central-mixed concrete. Illustrations are given of the body used in seven other hauling jobs.
- CONTROL PANELS—Bailey Meter Co. has released Bulletin No. 170 which discusses the engineering and economical planning of modern combustion and process control panels. Panel designs and methods of tubing and wiring are illustrated. A section on panel accessories is included.
- CONTROLLERS—The Bristol Co. has published a 12-page bulletin, (No. C305) describing its line of time-cycle controllers. Information is given on the application of these controllers in timing industrial process operations. The bulletin illustrates the various models available and describes the principle of operation in detail.
- CONVEYORS—E. F. Marsh Engineering Co. has published Bulletin SF-1 on its standard tubular frame conveyors. Various conveyor installations, equipment details are illustrated and general dimension and specifications charts are given.
- CUT-OFF RELAY Minnespolis-Honsywell Regulator Co., Brown Instruments Div.,
  has published Bulletin 850° which describes
  its relay designed for use in electric control
  circuits to shut down the process when a predetermined control point has been reached. The
  bulletin contains application and operational
  data, specifications and installation information.
  - DETACHABLE CHAINS—Chain Belt Co.
    has published Bulletin No. 52-52 describing the
    Rex steel detachable chain for use primarily by
    agricultural implement designers. Illustrations
    and descriptions of plain chain and attachments,
    detachable chain drive, and conveyor applications, along with tables giving dimensions,
    weights, prices, strengths, and lengths, are given.
    Of value to designers are sections on chain
    theory, chain travel, recommendations for
    drives, conveyors, etc.

- DIESEL SHOVEL—Marion Power Shovel
  Co. describes use of its Marion 111-M diesel
  shovel with 4-cu. yd. dipper in Bulletin 402-A.
  Typical applications are shown of the unit,
  available as standard shovel, long-range shovel,
  or dragline. Other features mentioned are machineary deck, frame strength, machinery assemblies, and independent boom holet.
- 13 DIESELS—Sheppard Diesels has released a bulletin on its line of diesel industrial tractors. The equipment is illustrated in Standard equipment and special purpose units.
- DISC BRAKES—Goodyear Tire & Rubber Co. has issued an illustrated booklet describing development and application of Goodyear industrial brakes. Advantages of single-disc brakes are listed. Use on high-speed band saws, mine loading machines, aircraft wind-tunnel fans and mine shuttle cars are also shown.
- DRAINAGE AND IRRIGATION—Gar Wood Industries, Inc., has published an 8-page booklet titled "Why Drain Land." The booklet describes and illustrates in detail the many reasons for tile drainage and underground irrigation. A list of governmental agencies where a farmer can obtain financial aid and technical assistance is included.
- DRILL BITS—Calumet & Haica, Inc., Calumet Div., has released a booklet entitled "Liddicost Drill Bit Booklet", of interest to quarry owners. Bits for easy-to-drill rock, strong rock and abrasive ground are featured. Pilot construction design and drilling advantages are also illustrated.
- abrator & Equipment Corp. has released Bulletin 402 which describes dust collection in the mining and metallurgical industries. The brochure shows how Dustube cloth-tube-type collectors are used in filtering gases from such equipment as lead blast furnaces, sintering machines, etc. Also discussed is the role of synthetic fabrics in the filtration of hot or corresive assess.

- ENGINES AND POWER UNITS—Minnespolis-Moline Co. has released Bulletin 1026
  on its high-turbulence power engines and power
  units. Construction features, cross section diagrams and accessory equipment are illustrated.
  The various models are described. Individual
  parts of the equipment are illustrated and dis-
- FIREPROOF PERLITE—Perlite Institute has issued an illustrated pamphlet titled "Fireproofing with Perlite." The booklet summarises basic details of 32 approved fire retardant constructions using lightweight planter or concrete made with perlite aggregate. Diagrams show the required thickness of perlite planter or concrete, furring details and other basic elements to obtain the listed fire rating.
- 20 FLEXIBLE HOSE—American Ventilating Hose Co. has published an illustrated Catalog No. 35 describing Flexaust hose. Uses, applications, and installation data are included.
- GEAR DRIVES—Link-Beit Co. gives the advantages, fields of application and correct selection of helical geer drives in its illustrated 16-page book No. 2451. Cross-sectional views, construction features and photographs of typical installations are included.
- HYDRAULIC HOISTS—The Galion Alisteel Body Co. has issued a series of 15 technical data bulletins descriptive of its complete line of hydraulic hoists. The bulletins include specifications, hoist type, weight, stroke, cylinder diameter, mounting height, dump angle and piston rod diameter. Close-up hoist photos and application pictures are included plus a hoist capacity reference table.
- 23 LINER PLATES Armoo Drainage & Metal Products, Inc. has issued an illustrated folder describing use of its liner plates in construction of aggregate tunnels. Typical installations, cross-section drawing, and strength and weight table are shown. Liner plate sizes and gages for various type tunnels are also given.

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# Information on

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- LUBRICATION—The Texas Co. has released Vol. 38, No. 12, of "Lubrication." This issue gives the story of lubrication from 1902 until 1952. The story is illustrated with crosssectional drawings, sisetches, photographs, graphs, charts and diagrams.
- MASONRY UNITS—The Celotex Corp. in its Celocrete Newe, Vol. 12, No. 1, discusses lightweight masonry units. Applications in stores, homes, and mines are illustrated. Its uses in modern concrete and masonry construction are also listed.
- MATERIALS HANDLING TRUCK—
  Yale & Towne Manufacturing Co. has released
  Bulletin P-1173-A which describes the PakLoader system for handling materials with
  fork lift trucks in unit loads without the use
  of pellets. Operational details are illustrated.
- 27 MORTAR CEMENT Universal Atlas Cement Co. has published a booklet explaining characteristics of mortar cement. Shrinkage, plasticity, water-retention, durability, strength, etc. are discussed from the standpoint of engineers, builders, masons and other users.
- PERFORATED STEEL.—Cross Engineering Co. has announced publication of its reference book, "Cross Standards of Perforated
  Steel" giving detailed specifications, formulas,
  illustrations, tables of standard equivalents and
  data forms. Steel segments, sections, decks, and
  parts for various types of machinery are also
  described.
- PLASTER FAILURES United States Government Printing Office, Division of Public Documents, Washington 25, D.C., has released a Building Materials and Structures Report "Investigation of Failures of White-Coat Plaster" which describes the results of an extensive inquiry into the causes of plaster failures, and explains the reasons for white-coat bulging and blistering. National Bureau of Standards chemists outline their recommendations for preventing failures. Illustrations, charts and graphs supplement the text. The bulletin is available from the Superintendent of Documents at 25 cents a copy.

- PNEUMATIC EQUIPMENT—Committee on Engineering Education of the Compressed Air and Gas Institute, has issued "Compressed Air Power in Industrial Production" pointing out uses of pneumatic equipment, such as drills, air hoists, sandblasts, grinders, and compressors. Tables, cross-section drawings and specifications are also given. The 36-page pamphlet is available at 25 cents per copy from the Compressed Air and Gas Institute, 1410 Terminal Tower, Cleveland 13, Ohio.
- POWER CRANES AND SHOVELS —
  Koehring Co. has compiled a series of eight
  articles discussing and illustrating the principles of power shovel and crane operation in
  a booklet, "Use and Application of Power
  Cranes and Shovels." Drawings, graphs and
  tables are given along with selection information, operation requirements, and capabilities
  of various execustor and crane attachments.
- PUMPS Allis-Chalmers Manufacturing
  Co. has issued Bulletin 52B6083A which describes the construction features of its supporting-adapter type, close-coupled general purpose pump. Alternate sealing arrangements available are diagrammed in the bulletin and a table of dimensions is given.
- PUMPS—Nagle Pumps, Inc., has published a 36-page catalog describing the complete line of its pumps, including types "TW" and "AW" which are recent additions to the line. Priming data, dimensions, discharge size, materials of construction, etc. are included.
- RUST-PREVENTIVES Rust Oleum Corp. has released a 16-page, 1953, general catalog, featuring 73 color chips of its products, including machinery and implement finishes, chemical and heat resistant types and masonry coatings. Questions and answers concerning surface preparation and application are listed.
- 35 SAFETY TREADS Wooster Products, Inc. has issued a 36-page illustrated booklet describing the design, application, repair and purchasing of safety treads. Cross-section drawings, typical installations and specifications are

- SHEET METAL—The Kirk & Blum Manufacturing Co. has issued a 40-page illustrated brochure entitled "Sheet and Plate Fabrication", presenting the Kirk & Blum fabricating plant and manufacturing facilities. Breechings and casings, factory equipment, stampings, concrete forms, transportation equipment parts, tanks, etc., are also illustrated.
- SPRAYING EQUIPMENT—White Showers, Inc. has released a bulletin describing and illustrating its line of spraying equipment including spray nozzles used in curing concrete products. Couplings, turning unions, roller bearing hangers, and oscillators are also listed.
- TOTALLY-ENCLOSED MOTOR—U. S. Electrical Motors Inc., has published bulletin No. 1784 describing its totally-enclosed motor. The various models are illustrated and described. A cutaway view shows the internal construction and individual features are discussed.
- TRACK SCALES—Cox & Stevens Aircraft Corp. has released an illustrated catalog describing electronic track scales for motion and stationary weighing of freight cars. Accuracy, installation, operation and maintenance data are also given.
- TRACKMOBILE Whiting Corp. has published "Reports From The Field on Trackmobile Savings and Advantages," presenting a case study picture of the machine's advantages from a man-hour and track or road operation standpoint, as reported through use in the cement and other industries. Benefits in freight car handling and dollar savings are also given.
- TRACTIVE EQUIPMENT Caterpillar Tractor Co. has released the booklet "Tracts to Profit" (Form No. 30556) which describes some of the company's tractive equipment. Phantom and model views explain the company's claims for its track-type equipment.
- TWO-WAY RADIO—General Electric Co. has released a booklet which discusses the use of two-way radio for better coordination of men, materials and machines. The booklet, titled "Instant Communication," is slanted to those businesses using materials handling and emergency service equipment, and others which have plant protection problems.
- V-BELTS—Allis-Chalmers Manufacturing
  Co. has released Bulletin 20B6497A on its
  "Textrope" grommet V-belt. Cross sectional
  construction drawings are shown, dislimed advantages are listed and construction features
  are discussed.
- VALVES—Ledeen Manufacturing Co. describes in Bulletin 1000 its line of hand, foot, power and solenoid-operated valves, featuring disc-type construction. Valve uses for operating air and hydraulic cylinders, single and double acting, and air motors are discussed. Also included are illustrations, dimensions, weights, and operating and circuit diagrams.
- 45
  WELDING RODS—Wall-Colmonoy Corp.
  has released Form 102 listing properties, application methods, and uses of Colmonoy No. 1
  hard facing welding rod. Application drawings
  and illustrations are given along with size and
  hardness information.
- WIRE ROPE—Union Wire Rope Corp.
  has put out a bulletin, "Rope Dope" which
  gives minimum breaking strengths based on
  operating conditions, equipment design and
  established practice. Also included are calculation instructions and a rope stress chart.

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These three photos were taken on the same day . . . picture proof that Lorains "deliver the goods" over many profitable years!

The setting for this story is in the Bonne Terre, Missouri, quarry of Valley Dolomite Corp. It began 16 years ago — way back in 1937 . . . and the story is still going on. Study these three pictures. Note the dates each Lorain was purchased. The first Lorain sold the second . . . and the second sold the third. Best of all, the two veteran Lorains are still going strong. That's why Valley Dolomite made it Lorain again . . . a big, new 2-yard Lorain, Model 820-J, purchased in 1951.



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In quarry after quarry, you will find repeat Lorain owners like this one. You'll find them because Lorains have what it takes to slug it out with the roughest rock and keep on going year after year. You will find repeat owners because Lorains offer the world's greatest selection of sizes, mountings and front-end types to fit every need that comes along. It's a Lorain shovel-crane story that will pay you quarry profits . . . check that story with your local Thew-Lorain Distributor for your very next need.

THE THEW SHOVEL CO. LORAIN, OHIO

The 2-yard Lorain shovel (at right), Model 820-J, purchased by Valley Dolomite in 1951, produces 2000 tons each 8-hour shift—ample proof of prolitable performance!

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# Agronomists' Views

(Continued from page 130)

should be lost at the rate of only about 200 lb. per acre per year, or in other words, a ton should last about 10 years.

## Returns \$17 for Every Dollar Invested

Assuming, however, that it lasts only about half that long, or five years, the returns per ton at present crop prices would range for the six fields considered, from \$164 per ton from the field giving the highest return to \$30 per ton for the field giving the lowest return, or for the average of the six fields, \$85 per ton. Charging \$5 per ton for the agricultural limestone and expressing returns from the standpoint of per dollar invested in limestone, the highest return would be \$33 per dollar invested and the lowest \$6, and for an average of the six fields the return would be \$17 for each dollar invested.

It has been estimated that the annual need for liming material in Kentucky for the land devoted to crops and pastures is about 1,500,000 tons. Even with the liberal aid that has been granted Kentucky farmers by the government in the purchase of liming materials, the annual need has been falling some 600,000 or 700,000 tons short. A study of the facts given above should convince Kentucky farmers that they cannot afford this loss, even if they have to borrow the money to purchase this needed material.

Farmers are now in a squeeze, between rising cost of production and diminishing farm prices, which means they must use every known trick to bring about more efficient production in order to maintain prosperity. The major factor in bringing about more efficient farm production lies in increasing the productive capacity of their farm lands.

If the same consideration were given to supplying the needed soil amendments to all other crops grown in Kentucky, as is given to the tobacco crop, the yields of these crops could doubtless be doubled. The greatest profit could be obtained by supplying the optimum agricultural limestone and fertilizer needs to mixtures of grasses and clovers grown for pasture and meadow, including grass silage. Alfalfa and grass mixtures should be used more extensively in this connection than has been the case in the past. The possibilities for increasing the income on Kentucky farms are the greatest in the realms of grasslegume mixtures, because of their greater response to soil amendments, and because of their high value as pasture and feed for livestock. Finally, they play a most important part in soil building and soil conservation.

Due to limitation of space, several outstanding articles by agronomists will be published in the May issue of ROCK PRODUCTS.—The Editors.

# How to Promote Use of Agstone

By J. B. PETERSON"

AGRICULTURAL LIMESTONE PAYS BETTER than any other soil treatment where it is needed. It is always amazing to note that farmers are not using nearly enough and that many farmers do not use any. In fact, soil scientists are finding out that in many cases there has been a tendency for farm advisors and managers to recommend less than the true lime-requirement for very acid soils because they were afraid that farmers would be shocked at rates higher than two or three tons an acre.

At one time I suggested that the agricultural limestone producers might profit from putting men in the field to promote educational work on the value of liming material for land. I suggested these men could work directly with high schools, adult classes, Future Farmers, 4-H leaders, veteran teachers, universities and experiment stations. Such men could keep in close contact with research results showing the value of liming materials with the educational techniques for putting this information over. They could carry this know-how to all folks working with farmer groups. This is much the same type of activity carried on by the so-called area men or field men employed by the larger fertilizer companies.

I do not believe many men would be needed; probably one or two for the whole corn belt area. Their main objective would be to build up and keep current a strong publicity campaign on the value of liming and the ways of getting it done. There is a great force of workers ready to do just this, if they can find the time and get the money to back some publicity stunts such as contests, short courses, etc. I refer to the host of teachers in the "Ag" colleges, extension men, county agents, Soil Conservation Service employes, vocational teachers, veteran teachers, 4-H leaders and so forth. They need money to help them prepare and publish attractive literature and such visual aids as posters, demonstrations for schools and fairs and moving pictures.

Because liming is so sound, all teachers of agriculture in high schools and all university teachers and extension men are trying hard to put the story over. I think they would be very willing as a group to support any sound, non-partial educational campaign.

Specific projects which could be sponsored are:

1. An agricultural limestone day or half-day at such events as the fertilizer conferences or schools put on annually by many land-grant colleges. Universities could well use such tangible subsidies as the underwriting of

# SIZING - DEWATERING



# GYROSET VIBRATING SCREENS

The GYROSET Screen has a positive eccentric action giving a full circle throw thruout the length and width of the screen surface. It is of the two bearing type providing minimum moving parts to give the required eccentric action.

The GYROSET in addition is adjustable readily in the field, without special tools, to any one of eight stroke settings ranging from 0 to 36".

All moving parts run in a bath of oil and are sealed against the entrance of foreign matter. The mechanism is outside of the deck structure, the only portion within the line of the flow of the material being the shaft housing which occupies only a limited amount of space.

The GYROSET Screen can effectively scalp or size. Due to the adjustable eccentric action, the ability to operate at high speeds and at any degree of pitch or slope, the

GYROSET Screen can be readily adjusted as to action to give maximum volume for rough scalping—or it can be adjusted to give the highest possible degree of efficiency in grading and at higher capacity than any other screening unit.

To satisfactorily dewater, a vibrating screen must not only have an action capable of conveying the solids across its length but must have sufficient vertical action to drive the liquid thru the mesh. In other words, sufficient to break the surface tension of the liquid and pass it thru the screening media—in volume.

GYROSET Vibrating screens have that type of action in their adjustable positive eccentric stroke, giving full circle throw motion to the entire screen area.

Gyroset Vibrating screens are made in one to 3 decks and in width from 18" to 72" with lengths from 4' to 16'.

WRITE FOR PARTICULARS

# PRODUCTIVE EQUIPMENT CORP.

2926-28 W. LAKE ST.

CHICAGO-12, ILL.

ABREAST
WITH
INDUSTRY
TRENDS
THROUGH
ROCK
PRODUCTS



<sup>\*</sup>Head, Department of Agronomy, Purdue University.





- For joining grader, trencher, ditcher and other earth moving conveyor belts.

  For belts \( \frac{1}{2} \) to \( \frac{1}{2} \) thick.
- A FLEXCO fastener that is HINGED. Has removable hinge pin.
- Troughs naturally, operates through take-up pulleys.
- Strong, durable . . . pull or tension is distributed uniformly across joint.

Order From Your Supply House. Ask for Bulletin HF 500.

FLEXIBLE STEEL LACING CO. 4684 Lexington St., Chicago 44, III.

VERYDAY — WITHOUT SHUTDOWNS

CLEVELAND
WIRE SCREENS

Everyday—around the clock...less down time...increased tonnage... greater production can be yours when you install longer life "Cleveland" Wire Screens. Tough—yet ductile, produced by craftsmen, "Cleveland" wire screen sections maintain rigid accuracy of openings, have fewer wire breaks, prove greater resistance to abrasion, corrosion and fatigue. Mail us your requirements—our specialists will make recommendations at once.

Write for Bulletin No. 5 and 6.

THE CLEVELAND WIRE CLOTH & MFG. CO.

banquets, honorariums for outstanding speakers, etc., if no strings were attached and no favors asked.

The preparation of a moving picture on the magic of liming material, with well worked out narrative pointing up its profitableness for the farmer.

3. Materials to be used in hallway displays for primary and secondary schools and fairs. Contests could be sponsored for outstanding exhibits and prizes given to winning youngsters or teams of youngsters. This sort of thing is done by hybrid corn companies for their growers who win contests. One company puts on an annual dinner in one state inviting all local winners in for a good meal and entertainment.

If you handle it in a fair, unbiased way, putting the common good to be gained through knowledge of this good and much needed product first, you probably could arrange to work together with the Smith Hughes organization of a state. Your man would simply have to win the confidence of the 4-H people or others in the fact that you were willing to aid in a sound educational program about liming materials, aimed at the common good. It would be necessary to include all materials and all reputable producers in the program, to have it accepted by an educational group.

4. Essay contests for high school and college students could be a means of focusing attention on the value of agricultural limestone. Your field men should sort out the data or urge experiment station people to sort out the data showing its economic value. Mimeographs, circulars, leaflets, etc., could be furnished those entering the contest. Award-convocations, dinners, etc., would be used to bring the subject before the public.

5. Many educational institutions have data they would like to get out to the public but can not because of limited funds. Subsidies by fertilizer companies in aid of unbiased bulletins carrying results of tests with soil minerals are not uncommon. With proper financing very attractive publications telling the story of agricultural limestone and its value and carrying good colored illustrations would catch the eye of the public.

6. Where good experimental data are lacking, subsidies for labor and travel would speed the work. Twoyear fellowships whereby a boy would work out his master's degree on the study of the economic benefit of a liming materials program or similar problems, would speed up research and the release of valuable data showing the need. Such subsidies must be given without strings to be acceptable and the data must be regarded the property of the research institution for release as they see fit. Otherwise, few institutions would accept such grants.

In other words, I am saying that since you have such a sound program to put over and such a needed product

to sell, it would be to the benefit of agriculture if you could get farmers who need lime to use it. By supporting the research and educational agencies you could really put on an interestcatching educational and publicity campaign which might sell a lot of liming materials. The men you pick to work between your group and the institutions would have to be well-trained, top-notch, sound fellows, who would have the respect of the professional men. They would not need to be highpressure men. They would need to be intelligent, alert men who would see where a few dollars put in by industry would support and aid the research and educational programs now already going, so that agricultural limestone would be brought to the fore and people become more aware of its use and its value.

# Private Industry Buys U.S. Magnesium Plant

PRIVATE INDUSTRY has taken over complete ownership and management of the federal government's large Basic Magnesium, Inc., plant near Las Vegas, Nev. The government built the plant during World War II, at a cost of \$116,000,000, for the production of magnesium. Current production includes chemical, mineral and metal products and also titanium metal.

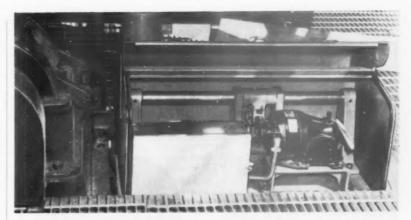
Final transfer into private ownership came with the sale of the last small portion of the plant by the state of Nevada. A total of 50 companies are now co-owners of the plant, including United States Lime Products Corp., Stauffer Chemical Co., Western Electro-chemical Co. and National Lead Co.

General Services Administration, which handled the transaction, stated that Nevada's Colorado River Commission had originally agreed to buy the plant for \$24,021,000, with \$1 down in 1948, to keep it from going for salvage. The 50 companies which have now taken over the plant have formed "Basic Management Corp.," to provide utility, highway and other services for the occupants.

A credit of \$4,000,000 against the purchase price was made by transfer, to the Department of the Interior, of electric transmission lines to the plant from Hoover dam. Final payment to the government comes due in 1968.

# **Computing Service**

MATHEMATICAL COMPUTING SERVICE, Brooklyn, N.Y., announces that with the increasing importance of mathematical methods in the field of mining engineering, it has established a division devoted exclusively to applied mathematics. This division specializes in performing services for industries desiring engineering calculations, charts and nomographs, and treatment of related mathematical problems in the field of mining engineering.



# **GEARY-JENNINGS** Sampler takes all of the stream part of the time!

Cutting the stream of materials at right angle and taking "all of the stream part of the time" are the basic reasons for the worldwide reputation of the Geary-Jennings Sampler. Its application to sand and gravel is simple, flexible and ruggedly dependable.

# **Automatic Controls**

Both the speed of cutting action and the intervals have automatic electric controls, easily set, and absolutely shielded from tampering or intrusion of dust.

For full details on the machine and the perfected cutter for dry materials — shown at right — send us your request in writing.



Leaders in Experience & Service

# THE GALIGHER CO.

CONSULTATION . ORE TESTING PLANT DESIGN. . GEOLOGIC INVESTIGATION

HOME OFFICE: 545 West 8th South, Salt-Lake City, Utah, P. O. Box 209
EASTERN OFFICE: 921 Bergen Avenue, Jersey, City, New Jersey
Agents in All Principal Foreign Mining Districts

# ROCK

PRODUCTS

FEATURES

TIMELY

INDUSTRY

NEWS

EACH

ISSUE

# Slurries...handled at lower cost

The new WILFLEY
MODEL K Centrifugal Sand Pump
embodies important
mechanical improvements especially
adapted to the
handling of cement
alurry and results in
stepped-up production and substantial
power savings.
Individual engineering. Write for details.

A.R. WILFLEY

& SONS, Inc.
Denver, Colo., U.S.A.

Naw York Office: 1775 Broadway, N.Y.C.





# PYRASTEEL

# SEGMENTAL KILN ENDS FOR CEMENT PLANTS . . proven satisfactory in THOUSANDS of Installations

Avoid burnouts and shutdowns, and insure years of continuous service, by equipping your kilns, both feed and discharge ends, with PYRA-STEEL Segmental Kiln Ends.

PYRASTEEL is equally effective and economical in many other high-heat applications, including clinker coolers, conveyor screws, feed pipes, and drag chains.

Over three-quarters of the annual cement output is produced in plants using either or both of our alloys, PYRASTEEL and EVANSTEEL.

Unit Segments are easy to install or replace





PYRASTEEL KILN END,

Discharge end

Write for PYRASTEEL Bulletin

# CHICAGO STEEL FOUNDRY CO.

Mukers of Allay Steel for Over 40 Years

Eliminate 70% to 90% of Conveyor Downtime





MOTORIZED HEAD PULLEYS

chains, belts, sprockets, Universal drives, countershafts, etc.

# EVERYTHING is contained INSIDE the pulley shell!

HERE'S a money-saving departure from conventional conveyor drives. A Cedarapids-Schrock Motorized Head Pulley is simply a new application of the long-proven gear reduction drive, with everything... electric motor, reduction gears and all moving parts... contained inside the drum, completely protected from grit, dirt and weather and with no outside parts or motors to service. 70% to 90% of conveyor trouble and downtime is saved by eliminating the exposed parts necessary with conventional pulley drives. In operation, the pulley shell rotates about

the electric motor which is held stationary by a torque arm attached to the conveyor frame. The speed of the shell depends on the combined reduction ratio of the pinions and gears inside the shell. Compact, easy-to-install, job-proved Motorized Head Pulleys are available in sizes from 5 to 30 HP and in various widths.

5 to 30 HP and in various widths. Find out all the advantages of converting your belt conveyor or belt-bucket elevator installations to motorized efficiency before you need head pulley replacements. See your distributor today, or write for Bulletin MP-1.

IOWA

MANUFACTURING COMPANY
Cedar Rapids, Iowa, U. S. A.

Built for sale in Arizana, California Nevada, New Mexico, Southern Oregon, Southwestern Utah and Texas by

YUBA MANUFACTURING CO.
(Pulley and Sprecket Department)
Benica, Calif.

### **NEW INCORPORATIONS**

Wico, Inc., Fort Wayne, Ind., has been incorporated with 100 shares of \$100 preferred stock and 100 shares of common stock, no par value. The company will produce concrete tile and other concrete products. The board of directors consists of Franklin M. and Katherine L. Ivins, and John H. and Evelyn Walker. Mr. Ivins is resident agent.

The Mohawk Sand & Gravel Co., Melmore, Ohio, has been incorporated by Milton N. Swanson, Anthony A. Carollo and Mary Llew Doman. Stock issued was 1000 shares of common stock, no par value, and 1000 shares of preferred stock, value, \$50.

Pueblo Pre-Mix Concrete Co., Pueblo, Colo., has been incorporated by Edward L. Williams, Oliver N. Lindstrom and Hoyt E. Stice, all of Denver, Colo. Authorized capitalization was set at \$125,000, with stock divided into 1250 shares of \$100 par value.

Fort Scott Hydraulic Cement Co., Inc., Fort Scott, Kan., has been incorporated with an authorized capital of \$150,000. The company will deal in cement, agricultural limestone and building materials. David P. Thomas is resident agent.

Tri-County Redi-Mix, Inc., Watertown, Wis., has been incorporated with 1250 shares of stock, no par value. Minimum capital was listed at \$500. Robert W. Palmer, J. L. Palmer and Nicholas A. Lombardi are the incorporators.

Concrete Materials, Inc., Charlotte, N.C., has been incorporated with an authorized capital of \$250,000. Principal stockholders are Rowe O. Evans and Peter J. Verna, Jr. The company will produce ready-mixed concrete.

Crowe-Gulde Cement Co. of Hereford, Hereford, Texas, has been incorporated by C. T. Crowe, Stanley Crowe and Joseph F. Gulde. Capital stock was listed as \$30,000.

Arkansas Valley Precast Concrete Co., Pueblo, Colo., has been incorporated with an authorized capital stock of \$50,000. The new firm is headed by Preston J. Wallace.

Gypsum Application and Supply Co., Chattanooga, Tenn., has been incorporated by J. F. Wheless, William C. Kennedy and Jerry W. Harper. Capitalization was listed at \$5500.

Empire Concrete Products Co., Inc., Ephrata, Wash., has been incorporated by T. D. Nesse, P. C. Edwins and N. K. Tvedt. Capitalization was listed as \$160,000.

Taylor Rock & Sand, Willcox, Ariz., has been incorporated by Jess Taylor.



with Scraper Longer in Tough Going!



# "No Other Rope Even Comes Close to Comparing with Tuffy Scraper Rope"

Says an Iowa Contractor
(Name on Request)

More and more operators of scrapers are switching to Tuffy Scraper Rope... and there are good reasons why! Tuffy is so designed to resist drum crushing caused by rope cross-overs—flexible enough to withstand sharp bending and hug sheave grooves. Tuffy's good slack line behavior helps it hold up better under the shock of load impact on slack line—a condition multiplied in scraper service. Remember, Tuffy is easy to order; just specify length, diameter and "Tuffy!"



# MANUFACTURERS NEWS

Chase Bag Co., Chicago, Ill., announces that Robert N. Conners, vice-president, general sales manager and



Robert N. Conners

a member of the board of directors, has been appointed executive vice-president. William N. Brock, assistant general sales manager, has been named general sales manager.

Mr. Conners joined the Northern Bag Co., pre-

decessor to the Chase Bag Co., in 1922, as a salesman in northern Minnesota, North Dakota and Montana.

He was appointed manager of the Minneapolis branch in 1930 and seven years later became general sales manager in Chicago. In 1938 he was elected vice-president and a member of the board of directors.



W. N. Broc

Mr. Brock started with the company in 1934 as a salesman in the Chicago and western Michigan areas. He later became manager of the Detroit sales office. In 1942 he was made manager of the Toledo branch where he remained until 1945 when he was made assistant general sales manager in Chicago.

The Colorado Fuel & Iron Corp., New York, N.Y., announces the appointment of Fordyce Coburn as district manager in charge of operations for the E. & G. Brooke, Claymont and Buffalo plants. Mr. Coburn will continue to serve as general plant manager of the E. & G. Brooke plant and as vice-president of Richard Ore Co. His headquarters will be at Birdsboro, Penn.

Western Machinery Co., San Francisco, Calif., has acquired Smith Booth Usher Co., Los Angeles, distributor of construction equipment in the West, which will be operated under its own name as a division of Western Machinery. Herbert J. Mayer, general manager of the industrial sales division of Western Machinery, will be acting manager in Los Angeles.

R. G. LeTourneau, Inc., Peoria, Ill., announces the appointment of A. M. Krider as sales manager for central United States and central Canada. He succeeds W. V. Richards, who has joined the Great Plains Equipment Co., Omaha, Neb., LeTourneau distributor, as manager in charge of construction equipment sales. Mr. Krider was formerly sales representative in Canada and the U.S. and will be suc-

# Tuffy

7 Ways Better for DRAGLINES!



"Gives Better Service Than Any Other Rope"

Says Maintenance Superintendent of Arkansas Construction Company (Name on Request)

(1) Wires of finest steel in a (2) construction specially designed for universal dragline service give Tuffy (3) extra flexibility ... make it (4) extra easy to handle. You'll find Tuffy Draglines (5) spool better and (6) ride better on grooves. And you get (7) maximum abrasive resistance since Tuffy materials are toughened to withstand more abrasive wear! Time and again, Tuffy Draglines stand up under more days of service and move far more yardage than the best previous average obtained by many operators ... operating in dry dirt, wet dirt, sand, gravel, rock and minerals! To order, just ask for the length, the size and the name—TUFFY DRAGLINE!





Try AFCO balls. See for yourself how they grind longer and more efficiently, how they reduce grinding ball consumption. Write, wire or phone NOW for prices.



ceeded in this position by John Tuntas, who has been parts representative in the parts coordinating department. John Sharda, sales engineer in the Tournarope department, has been appointed district sales representative for Iowa, Illinois and Indiana. He succeeds R. E. Dickerson, who has joined the Illinois Contractors' Equipment Co., LeTourneau distributor, as manager of the East Peoria, Ill., branch office.

Detroit Diesel Engine Div., General Motors Corp., Detroit, Mich., has announced the appointment of Ernest



**Ernest F. Bentley** 

F. Bentley as general sales manager of the division. He succeeds V. C. Genn who died recently. Mr. Bentley joined the company in 1934 as an engine designer with the Winton Engine Corp., Cleveland, which later became the

Cleveland Diesel Engine Division. He transferred to Detroit Diesel in 1940 as project engineer and prior to his present appointment was operations sales manager. He also served as staff assistant to the general manager, production buyer, supervisor of control materials and manager of manufacturers' sales

Other appointments include Robert V. Baxley as operations sales manager; John C. Campbell as manager of manufacturers' sales; and Louis A. Steele as industrial sales manager.

Bay City Shovels, Inc., Bay City, Mich., announces the death on December 20 of W. Selwyn Ramsay, founder and president, at his winter home in Golden Beach, Fla. Born in Grey County, Ontario, Canada, Mr. Ramsay moved to Bay City in 1890. In 1913 he helped organize the Bay City Dredge Works and a year later was named president. He continued as president of the firm, which in 1929 became Bay City Shovels, Inc.

Hyster Co., Portland, Ore., announces that Frank A. Rostedt has sailed for Holland as general manager of Hyster Europe, N.V. He will make his headquarters in Amsterdam until the new Hyster plant is completed this year. He will then live in Nijmegen, Holland. Wilmer B. Morrow, chief accountant, succeeds Mr. Rostedt as comptroller and assistant secretary.

Pioneer Rubber Mills, San Franciso, Calif., has announced the appointment of Fred B. Getten as manager of the Dallas, Texas, branch, with headquarters in Dallas.

Caterpillar Tractor Co., Peoria, Ill., has announced erection of a new plant at York, Penn, Limited production at the plant is scheduled to start in May, 1953. Arkell and Smiths, New York, N.Y., has announced the appointment of W. M. Sloane as sales manager of the new midwestern sales division, with headquarters in Chicago, Ill. He was formerly a sales representative in the central sales division. John K. McIntyre has been appointed sales representative in the western division, with headquarters in the Kansas City office.

General Electric Co., Schenectady, N.Y., announces that Frederic H. Holt has been appointed manager of marketing and James W. Cooke, manager of engineering of the control department.

The Colorado Fuel & Iron Corp., New York, N.Y., has announced the appointment of John V. Boardman as works manager of the Claymont plant. He was formerly assistant works manager and succeeds W. P. Worth, who has resigned.

Morris Machine Works, Baldwinsville, N.Y., has announced the appointment of W. M. Mercer as sales manager. He succeeds William H. Pfarrer, who recently became head of the Chicago office.

Union Bag & Paper Corp., New York, N.Y., has announced the election of S. K. Bradley as vice-president in charge of Multiwall bag sales. He was formerly director of Multiwall bag sales.



In plants handling Cement, Lime, Gypsum, Sand, Gravel, Crushed Stone, etc. the WEIGHTOMETER is used for fast accurate production.

WEIGHTOMETER gives a continuous, automatic, and accurate weight record of materials in transit at an extremely low operating cost. All producers of bulk materials handled by belt conveyors need this dependable check on production figures supplied by MERRICK WEIGHTOMETER.

Merrick Scale Mfg. Co. Passaic, New Jersey

# CONCRETE PRODUCTS

CONCRETE UNITS . READY-MIXED CONCRETE



Unloading 60-in. reinforced concrete sewer pipe near Wheaton, III.

# GOCORP "Senior"

# HERE'S HOW GOCORP DOES IT.

 Direct Feed from main supply hopper to mold (no old fashioned feed drawer) plus intense vertical vibration (pallet clamped to mold) assures a uniformly dense unit.

 Sequence Operation for easy adjustment and greater production. Under Machine Pallet Return saves space and reduces labor costs with one man operation.

 Hydraulic Drive—Smooth trouble-free performance—reduces maintenance. GOCORP'S Johnnyon-the-spot factory trained men for help when you need it.

 Advanced Design gives you "Tomorrow's machine today."

ers v quantity production for lower unit production costs V reduced maintenance and uninterrupted production allowing you to keep the profits you've made.

AND with a GOCORP there's no fear of obsolescence.

For complete information on plain pallet machines, batch mixers (12 to 75 cubic foot capacity), pipe and tile machines, or junior cared pallet block machines write or phone today.

ADRIAN-MICH.

# **INDUSTRY NEWS**

# Large Pipe Contract

IDAHO CONCRETE PIPE Co., Nampa, Idaho, and Tellyer Concrete Pipe Co., Albuquerque, N.M., were recently awarded a joint contract to supply prestressed concrete pipe for a 14½-mi. water pipeline connecting Albuquerque to a nearby reservoir.

The two companies will produce the pipe in partnership on machinery invented and furnished by the Idaho company. Tradenamed "Cen-Vi-Ro," the pipe is also an innovation of Idaho Concrete Pipe Co. and receives its name from its process of manufac-ture: "Cen" stands for the centrifugal spin which the pipe undergoes when the concrete is poured into the form; "Vi" refers to vibration; and "Ro" refers to the roller used in exerting eight tons of pressure in forming the pipe. In the prestressing process, 8-guage wire is used under a stress of 125,000 p.s.i. The finished pipe sections are subjected to plant tests of 360 p.s.i. water pressure. The pipe will be produced at the Albuquerque plant on machinery built and shipped from the Nampa plant. George Jessen is president of Idaho Concrete Pipe Co. and Harry Tellyer is president of Tellyer Concrete Pipe Co. (See May, 1951, issue of ROCK PRODUCTS, p. 131, for description of the manufacturing process of Idaho Concrete Pipe Co.'s Cen-Vi-Ro pipe.)

### **Asbestos-Cement Products**

Sales of asbestos-cement materials, which reached new highs during World War II, have more than doubled in the post-war period, as recently reported by Chester C. Kelsey, manager, Asbestos-Cement Products Association, at the association's fall meeting in New York. He further reported that production of asbestos-cement products averaged nearly 1,000,000 tons in 1950 and 1951 and that the 1952 production figures, when completed, are expected to be even higher.

### Ready-Mix Plant

DELZER CONSTRUCTION Co. has started operations of its new ready-mixed concrete plant at Mandan, N.D. Plant equipment includes a 200-ft. belt conveyor, storage bins and eight 5½-cu. yd. transit-mixer trucks. The plant will be operated under the name of Deco Readymix Concrete. Ray Delzer is plant manager. The company also operates a ready-mix plant at Bismarck, N.D.

### **Opens Branch Office**

THE NATIONAL CONCRETE MASONRY ASSOCIATION has announced the opening of the Washington branch office in the Evans Bldg., at 1420 New York, N.W., Washington, D.C., with Theodore Leba in charge.



Minnis Shilling and United Concrete Pipe Co., Moses Lake, Wash., are placing concrete pipe sections, by use of a Lorain TL-25-J crane, over 10 miles of open irrigation ditch and laterals for the Columbia River Basin project

### **Concrete Block Plant**

MUSCOGEE CONCRETE PRODUCTS, INC., Columbus, Ga., founded soon after the close of World War II, has since expanded its operations and is now one of the leading concrete block producers in the Chattahoochee Valley area.

Original partners in the firm were Frank W. Elliott and Sidney McClue. In 1950, Mr. Elliott became sole owner and in May, 1952, the firm was incorporated with Mr. Elliott as president; Braxton Collins, vice-president; and James W. Moran, secretary.

The plant is equipped to produce over 5500 block per 8-hr. day, including cinder block and conventional concrete block and brick. It features the "Super-Bloc" and a new block called "Mingotile," on which a stone-like finish is molded.

### **New Flexicore Division**

MICHIGAN FLEXICORE DIVISION of Price Brothers Co. recently began operation of its new plant at Livonia, Mich. This is the first plant to be established in Michigan for the manufacture of Flexicore precast concrete slabs. Plant capacity is 1,000,000 sq. ft. of precast roof and floor slabs, Robert E. Beerbower is plant manager and William Cory is sales manager.

### **Expanded Shale Plant**

A PLANT for the production of lightweight aggregate from Missouri River shale is being established at Mobridge, S.D., by a group of business men from Mobridge and Rapid City, S.D. A similar plant was established at Rapid City last summer.

### Cover Picture

ILLUSTRATION shows 60-in, reinforced concrete sewer pipe being unloaded from trailer truck. The pipe was laid near Wheaton, Ill., in the fall of 1952.

LOVELAND BUILDING PRODUCTS Co. has started production of Cavitex brick at its new plant at Loveland, Colo. The plant was established by R. A. Buchholtz, New Haven, Mo. H. O. Renken, also of New Haven, has been named sales manager. The company also produces concrete block.

EPHRATA PRE MIX, Ephrata, Wash., has purchased the controlling interest of Quincy Brick & Mix, Quincy, Wash. The two companies are being merged under the name of Empire Concrete Products Co., Inc., with plants located in Ephrata, Quincy and Warden, Wash.

RADCLIFFE SILO Co., Topeka, Kan., has established a new plant at Ste. Genevieve, Mo., for the production of "White Top" interlocking concrete stave silos. Ben J. Held has been appointed district sales manager. J. H. Radcliffe is president.

TRI-COUNTY REDI-MIX Co., Hartland, Wis., owned by P. W., Ray F., James B. and Robert W. Palmer, has purchased the ready-mixed concrete plant of Vitcenda Redi-Mixed Co., Watertown, Wis., formerly owned by T. W. Vitcenda.

A. E. Pascal and George Hicks, Waterloo, Iowa, recently purchased the concrete corn crib division of Waterloo Concrete Products Co., and plan to establish their plant in Vinton, Iowa.

Baker Cement Products Co., Baker, Mont., established in 1947, was recently sold by C. G. Berwald to G. J. Mier. Mr. Berwald also owns concrete plants in Aberdeen and Mobridge.

GREER CONCRETE Co. has started operation of a new plant at Greer, S.C., for the production of ready-mixed concrete and concrete block. The plant is under the management of Heyward Ballard.

TRAIN'S CONSTRUCTION Co., Lindsborg, Kan., has opened a third readymixed concrete plant at Abilene, Kan. The other plants are located at Lindsborg and at the Salina, Kan., air base.

A CONCRETE BATCHING PLANT is being established in Sunnyvale, Calif., by Carl E. Anderson who also owns a ready-mixed concrete plant in Mountain View, Calif.

UMPHLETT BRIKCRETE Co. has started operation of a plant at Summerville, S.C., for the production of "Brikcrete" block. Owners of the company are M. W., C. W. and C. D. Umphlett.

SAGER CONCRETE Co., owned by R. W. Sager, is building a ready-mixed concrete plant at Jackson, Mich. Robert McFee has been named plant superintendent.

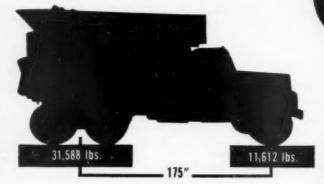
AMERICAN CINDER BLOCK Co. has leased property in Princeton, W. Va., where it plans to establish a concrete block plant.

# It's mounted RIGHT for largest

Here's why the exclusive Rex Adjusta-Wate design means greater legal payloads and bigger profits for you. It permits you to mount your mixer right...and the way your mixer is mounted on the truck body directly affects the 4 most important factors in economical, efficient ready-mix operation.

# TYPICAL ADJUSTA-WATE MOUNTING DEMONSTRATING THE IDEAL WEIGHT DISTRIBUTION AND MAXIMUM LEGAL PAYLOAD

A typical mounting of a Rex 5½-Yd. Moto-Mixer, taken from our files, on a truck of customer's choice, demonstrating the ideal weight distribution and maximum legal payload made possible by the exclusive Rex Adjusta-Wate design.



Weight of Truck.....12,100 lbs. Weight of Mixer.... 7,884 lbs. Weight of 80 gallons

of water...... 666 lbs Weight of 5½ yards

of concrete.....22,550 lbs. Gross Vehicle Wt....43,200 lbs. Distribution of Weight:

Front Axle: 11,612 lbs. Rear Axle: 31,588 lbs.

Wheelbase.........175"
Discharge point

behind rear tires...15%

## Wheelbase

Rex Adjusta-Wate design permits the shortest possible wheelbase commensurate with load to be carried. Means greater maneuverability, easier operation.

Rex Adjusta-Wate Mote-Mixers are available in 3-yard, 4½-yard, 5½-yard and 7-yard sizes. Rex Horizontal and Adjusta-Hite machines are available in 4½ and 5½-yard sizes.

A Complete Line of Truck Mixers to Meet Your Every Requirement

# legal payloads REX MOTO MIXER 2. Load Center of Gravity Rex Adjusta-Wate design places center of gravity well ahead of rear axle . . . assures a properly balanced load. 3. Clearance of Rear Wheel Rex Adjusta-Wate design assures ample clearance of rear wheels for maximum discharge spouting range. 4. Load Distribution on Truck Rex Adjusta-Wate design permits best possible weight distribution for full utilization of legal gross vehicle weight.

Remember, the Rex Adjusta-Wate Moto-Mixer...the first rear engine mounted truck mixer in the industry...has been in standard production for 2 years...It is still the only mixer that gains full advantage of rear engine mounting for larger legal payloads. Ask your local Rex distributor to demonstrate all the advantages of the Adjusta-Wate design to you. Chain Belt Company, 4649 W. Greenfield Ave., Milwaukee 1, Wis.



# WAREHOUSING Style

Nation's First Cave-Type, Ultra-Modern, Refrigerated Warehouse Hewn Out of Solid Rock Near Kansas City, Kansas



• Hewn out of limestone rock, with 72-ft.-thick roof, 40-ft. spans between solid-rock columns, and entry through a vertical ledge of stone, NATURAL STORAGE COMPANY's warehouse at Coldspur, Kansas, on the Union Pacific, 17 miles west of Kansas City, is a Gibraltar-like answer to modern-age storage problems.

This previously-mined area of a limestone deposit provides ideal storage conditions, safely above flood, floors at ground level, no limit on floor loads, with 150,000 sq. ft. and 2½-million cu. ft. of storage space, and plans for expansion to ten-million cubic feet.

Suggesting the utilization of many other subterranean mined areas for safe storage of all kinds, this cave-type warehouse has year-around 55° F. temperature, serving as natural insulation for added refrigeration to chill or freeze meats, vegetables and fruits, in separate rooms.

Finishing quality touch are heavy-duty floors of Lone Star Cement concrete, 5,000 cu. yds. to date, placed on the rock base—man-made

stone with the strength and durability for which Lone Star Cements are noted, on the basis of outstanding nation-wide performance.



Floor Construction:

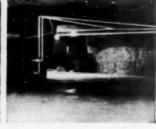
JOHN ROHRER CONTRACTING COMPANY

Ready-Mix Lone Star Concrete:

CONCRETE MATERIALS, INC.

both of Kansas City, Kansas







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LONE STAR CEMENT, WITH ITS SUBSIDIARIES, IS ONE OF THE WORLD'S LARGEST CEMENT PRODUCERS: 18 MODERN MILLS, 129,000,000 SACKS ANNUAL CAPACITY

# **Automatic Continuous Curing Kiln**

Builders Co., Madison, Wis., cures block in a 400-ft. continuous kiln which is completely automatic in operation. Handling block from machine to kiln also mechanized to reduce costs

### By L. DAVID MINSK

NE OF THE MOST EFFICIENT block plants in the country is located in Madison, Wis. A 400-ft. continuous kiln with completely automatic features, low manpower requirements and minimum handling characterize the plant of Builders Co.

The plant consists of gravel crushing facilities, sand and gravel storage both over the block plant and in eight 300-cu. yd. bins, the block plant with its U-shaped kiln, and yard storage for 300,000 units. Production is 150,000 8-in. units a month, using one Besser Super Vibrapac.

When Willis E. Gifford, president of Builders Co., began designing a plant in 1947, he laid down certain



Two sections of continuous curing kiln; section to the left is the room supplied with saturated hot air, and to the right is the return section to the cubing area. Uncovered area in the center eventually will be roofed and floored to provide covered storage

requirements to be met. These he had formulated from a year's travel visiting hundreds of concrete products plants throughout the country. The plant began operation in 1948 meeting those requirements: block hard enough to stack 16 ft. high (24 courses) as soon as they came out of the kiln; high quality block having low moisture content (as it turned out, block have 5 percent absorption) and high strength (2500 p.s.i.); and rugged, efficient, simple equipment.

### **Continuous Kiln Operation**

The 400-ft. continuous kiln progressively cures the block from 70 to 190 deg. F. for 24 hr., and for a low cost estimated at one-half that of the conventional curing methods. It is fully automatic: once a rack has been loaded by the block machine offbearer, it travels to the kiln, through it and back to the cubing room, without any man operating any switch or control, and without any man touching the rack.

Each rack holds 108 block (8 x 8 x 16 in.) and is fitted with four 10-in. dia. single-flanged wheels which travel on rails of 30 gauge. When a rack is loaded, the block machine operator releases a catch holding the rack in position; a chain then engages the rack, carrying it downgrade at a

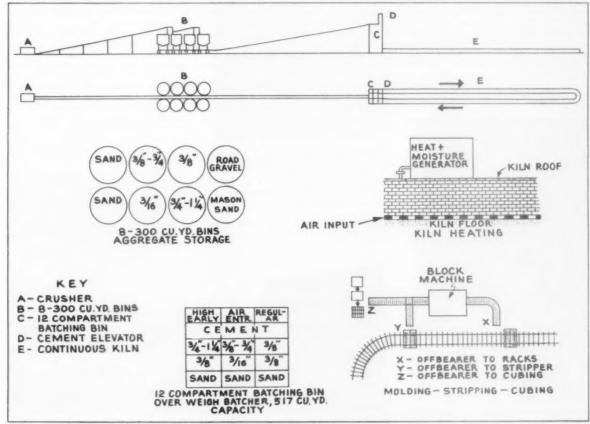
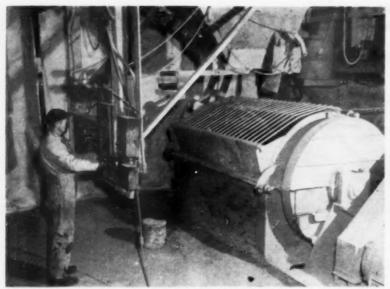


Diagram showing plant layout and continuous block curing system



Traveling weigh batcher positioned over 50-cu. yd. mixer

constant rate to a second power-driven chain section which positions it in front of a hydraulic cylinder. This mechanism has an exacting job: it must push all 98 racks in the kiln at one time, totalling 700,000 lb. with their loads, up a 2 percent grade. An 8-in. dia. cylinder extends 40 in. each cycle. A Vickers pump developing 900 p.s.i. operates the cylinder at 3000 p.s.i. Once the design was perfected, the unit proved to be virtually foolproof.

As the hydraulic cylinder extends, two pusher arms expand to contact push plates on the rack. Force is transmitted from rack to rack through contacting bumper plates. When the



Pusher arms retract as the ram returns to its no-load position. Dogs prevent racks from coming down the 2 percent upgrade in kiln

pusher arms retract to accept another rack, they are retracted also towards the centerline. Ten tilting dogs, welded to the track on each side, prevent the racks from rolling back out of the kiln.

As a rack of green block is pushed into the kiln, the rack of cured block (at the exit end of the kiln) strikes a limit switch opening the door at the end of the kiln. The aluminum door closes automatically as soon as the rack has left to prevent loss of steam. The rack now travels downgrade, by gravity, makes a 180 deg. turn and enters the return leg of the kiln. This is nothing more than a covered, unheated tunnel. A cable traveling at a constant rate and driven by a 1-hp. motor actuated by limit switches brings the rack back through the return tunnel. Most of the travel is downgrade.

The return cable brings the rack to the rear of the block machine, where it is stopped. Here a second workman operates an electrical off-bearer, placing each pallet load of cured block on a roller conveyor. Gravity carries this to a pallet stripper, which is actuated when the pallet



Belt conveyor transporting sand and gravel from crusher house to the screens over storage bins is fitted with a plow to remove all plus 3-in, material

strikes a control at the rear of the block machine. A bar pushes off the block onto a roller conveyor at right angle to the other, and at the same time air jets clean off the pallet as it is dropped into the magazine at the rear of the block machine. The block travel down the roller conveyor by gravity and are cubed on castorwheeled dollies by a workman using an electrical offbearer clamp. The two offbearers handling cured block are driven by P&H motors. The constant starting and stopping have required modification of only one part, improving ventilation of the motor housing.

The 4-ft. square dollies, made by Mercury Manufacturing Co., are operated in trains of eight. Block are cubed six courses high. When a train is fully loaded, a Clark fork lift truck, with a rear hitch, pulls it to the storage yard and stacks the cubes. A second train of eight empty dollies is pulled into place by the cuber man, and cubing is continued. Thus only one fork truck is required. The yard man with one fork truck stacks the cubes of new block and then has about 60 min, to load outgoing trucks before the next train of eight cubes are ready to be yarded. It takes about 70 min, for the cuber to build eight cubes on the dollies.

The flexibility of the plant is increased by the aggregate facilities.



"Odd lot" section of yard in which small amounts of popular shapes are palletized for customer



Willis E. Gifford, president of Builders Co., checks on placing trainload of cured block

A traveling weigh batcher can be positioned under any of three adjoining 250-cu. yd. bins, each of which has four compartments. Three of the compartments in each bin hold aggregates and one holds cement. In addition, a 3000-bbl. cement silo is being constructed adjacent to the plant. Each batch for the 50-cu. ft. mixer contains 4600 lb. of aggregates, consisting of three sizes of stone and sand, and 400 lb. of cement. Yield with this mix is 36 block per 94 lb. of cement, with a strength in excess of 2000 p.s.i.

A ready-mixed concrete plant has been installed on the mixer level, consisting of a 34 cu. ft. twin-batch paver mixer. Aggregates will be batched to this by the traveling weigh lorry. It is Mr. Gifford's intention to lease the central mixing facilities, selling the operator all materials.

## Use Heated Moist Air

Hot saturated air is generated by a modified commercial two-burner fur-(Continued on page 232)



Cubing nine block at a time on the castorwheeled dollies



Loaded pallets automatically move down roller conveyor to the machine operator



Black rolling down conveyor to cubing operator. In the background, to the right, an operator is placing pallet from rack onto first roller conveyor feeding pallet stripper. Only three men required; machine off-bearer; off-bearer to load pallet stripper; and cubing off-bearer



Eight 300-cu. yd. steel bins store aggregates from gravel crushing and screening plant

## **SALES** and **SERVICE**

## Stressed at Ready Mix Convention

Joint convention with sand and gravel industry had many papers of benefit to both industries on a variety of subjects

THE 23RD ANNUAL CONVENTION of the National Ready Mixed Concrete Association, held simultaneously with the 37th annual convention of the National Sand and Gravel Association, February 23-26, in San Francisco, Calif., covered a great variety of subjects of interest to the industry.

Many of the papers and reports were of interest to both industries, some of which are reported in our coverage of the N.S.G.A. convention presented elsewhere in this issue of ROCK PRODUCTS. Because of the scheduling of the program with its many joint meetings, both reports should be read for complete coverage.

#### Officers

Herbert G. Jahncke, Jahncke Service, Inc., New Orleans, La., was elected president of the National Ready Mixed Concrete Association to succeed R. K. Humphries. Robert C. Colins, Warner Co., Philadelphia, Penn., was re-elected a vice-president; Louis C. Schilling, I. E. Schilling Co., Miami, Fla., was elected a vice-president; and Robert Mitchell, Consolidated Rock Products Co., Los Angeles, Calif., was elected treasurer.

Elected to the executive committee were Russell P. Mumford, The Beckley and Myers Co., Springfield, Ohio; Thomas P. Eldred, Jr., The American Hard Wall Plaster Co., Utica, N.Y.; F. E. Schouweiler, Old Fort Supply Co., Fort Wayne, Ind.; and M. Eugene Sundt, Albuquerque Gravel Products Co., Albuquerque, N.M.

In addition to the officers and executive committee, the board of directors comprises George R. Bathe (1955), Ready Mixed Concrete Co., Omaha, Neb.; W. W. Duncan (1956), Clark Certified Concrete Co., Inc., Baltimore, Md.; Arthur J. Egan (1954), Ready Mixed Concrete Co., Minneapolis, Minn.; W. J. Hicklin, Jr., (1955), Capitol Concrete Co., Jacksonville, Fla.; Ezra C. Knowlton (1954), Utah Sand and Gravel Products Corp., Salt Lake City, Utah; Charles H. Latham (1955), The Lynn Sand and Stone Co., Swampscott, Mass.; Lee T. Mc-Court, (1955), Fischer Lime and Cement Co., Memphis, Tenn.; Charles P. O'Leary (1955), Terre Haute Concrete Supply Corp., Terre Haute, Ind.; Frank Penepacker (1956), Readymix Concrete Co., Portland, Ore.; John W. Roberts (1954), Southern Materials Co., Inc., Richmond, Va.; H. Irving Rhine (1956), Bode

Gravel Co., San Francisco, Calif.; Floyd G. Rubey (1954), Dubuque Ready Mix Concrete Co., Dubuque, Iowa; R. E. Sallee (1956), South Texas Materials Co., Corpus Christi, Texas; and Harold E. Shelby (1956), Concrete Supply Co., Charlotte, N.C. Otis H. Manchester, Concrete Transport Mixer Co., St. Louis, Mo., is chairman of the Truck Mixer Manufacturers Bureau, and Nathan C. Rockwood (ROCK PRODUCTS), Naperville, Ill., is an honorary member of the board of directors.

## **President's Report**

President Richard K. Humphries of the National Ready Mixed Concrete Association started his address before the opening joint session with a short statement of the growth and accomplishments of the association. He gave credit to executive secretary V. P. Ahearn and engineering director Stanton Walker for the high ranking of the association which, he said, was built because of their stature and achievements and because of the staffs they have trained to carry on the work. The large surplus of funds available was mentioned and the fact that membership is now in excess of 600, as measures of successful operation.

Among accomplishments of the past year, he mentioned the industry welfare program which has been completed. This program was started by Robert Porter and carried forward by Norman Fredericks, both past presidents of N.R.M.C.A. It makes low cost group insurance available to individual member companies.



Herbert G. Jahncke, Jahncke Service, Inc., New Orleans, La., new president of N.R.M.C.A., left, with retiring president Richard K. Humphries, Pacific Coast Aggregates, Inc., San Francisco, Calif.

A second accomplishment mentioned was obtaining price relief from O.P.S. at a time when many member companies were seriously pressed. Third, he touched upon the expansion of the technical short course at the University of Maryland which is considered of great value in providing an increasing number of technically qualified personnel to member companies to carry on in the years ahead.

Mr. Humphries then considered some of the problems that lie ahead, of which he considers zoning to be of prime importance. He called attention to how more and more member companies are becoming adversely affected each year through zoning regulations. It is important, he said, that industry members must put their story across to city, county and state officials in order to preserve their investments and right to stay in business. Producers have a responsibility to the public which requires that they keep the public informed of their plans, must obtain legal permission to set up a business in a given area, and then abide by their commitments. The public interest must be protected, he said, and the burden is on the industry to do its part.

He followed with comments on the subject of public relations generally and the importance of establishing practices that will be looked upon with favor by the public. Among the requirements are good housekeeping. the elimination of practices that might be considered as contributing to nuisances, the fencing of pits, adequate safety precautions, clean trucks in safe mechanical condition, good service, trained truck drivers, meeting of safe truck-loading requirements, elimination of spillage from trucks and many other goals which all members should strive to meet.

The matter of shortages of freight cars and cement was mentioned. According to Mr. Humphries, the inability of the aggregates and cement industries to obtain cars has cost the ready-mixed concrete industry millions of dollars. There is even a shortage of bulk truck transportation in some areas. Cement shortages, which have handicapped the industry for ten years, are expected to be a serious trouble spot in 1953. The industry's approach to the problem should be in continuing and expanding the areas of mutual understanding between the

industry, and the cement and railroad industries. Construction is expected to be maintained at high levels for many years to come.

In conclusion, Mr. Humphries, on behalf of the two northern California associations, expressed the pleasure of the two associations in having the conventions in San Francisco, and he thanked secretary E. R. Booker and all the California members for their participation.

## Sales Agreements

Rock Products Co., Los Angeles, Calif., chairman of a joint session on merchandising, introduced the subject with a talk on "Standard Clauses for Sales Agreements in the Ready Mixed Concrete Industry." Mr. Best listed some of the many factors to be considered in making sales agreements and on which there should be exchange of ideas in order to arrive at sound practice. His talk was for the purpose of stimulating discussion and developing ideas to bring up-to-date the latest information to guide the industry.

He referred to the standard clauses as published in 1947 by the N.R.M.C.A., which have been an effective guide and which was written on a national basis for adaptation in working out agreements for individual producers. This booklet is under consideration for revision to bring it more up-to-date, and it was urged that members supply the Washington office of N.R.M.C.A. with copies of their sales agreements for the purpose of a guide.

Suggestions were made to indicate the kinds of information sought. One is the question as to who is responsible for and who pays for cement testing. Mr. Best's company makes a charge of five cents per bbl. for cement tested in its own laboratory. Another is whether concrete is certified on a strength basis. His company sells concrete on the basis of cement content. The question of responsibility in event of a failure is another point which is important because workmanship of construction labor might be responsible for poor performance.

Policies with respect to overtime, premiums for holiday deliveries and sizes of loads are other factors on which information is desired. Mr. Best said that some companies charge a premium of \$1 per cu. yd. for concrete delivered on holidays. As to size of loads, it is desired to know more about minimum requirements and premium charges, if any, for loads below the minimum.

Unloading releases for sidewalk damages, free time and penalties, protection against damages to trucks and property, discount arrangements, guarantees on cement and aggregates, the extent of responsibility passed on to the customer for job delays, the responsibility and charges made when admixtures are used, and guarantees on yield were other items suggested as in need of exploration.

## **Merchandising Organization**

The need for good public relations and many other important considerations to building a sound business were pointed up in a talk, "Internal Organization of a Ready-Mixed Concrete Company for Merchandising its Products" by Harold E. Shelby, Concrete Supply Co., Charlotte, N.C.

In the ready-mixed concrete industry it is desirable that the majority of the employees have qualifications to do a job in building good relations, in Mr. Shelby's opinion. The dispatcher is the key man in sales and, if qualified, he must know the names of customers, the strengths and slump ranges of the product as batched, the timing of dispatching the trucks to the jobsite, the rate of placement and many of the other factors of importance to success in servicing the job.

Preliminary to supplying sizable construction jobs, he believes it advisable for a qualified representative to visit the jobsite, to meet the men on the job and become acquainted with the set-up. This display of in-



Donald G. Schuster, Schuster Quality Concrete Co., Green Bay, Wis., left, and Bill Bottini, superintendent of Eliot plant

terest is considered important in developing good relationships that will reflect in efficient handling of the job.

The quality of the driver, appearance of delivery equipment and adherence to safety practices are of importance because the public forms an opinion of a company through observing the appearance of its trucks and the actions of the drivers.

With a trend developing in many areas to supply concrete to meet compressive strength specifications, suppliers of such concrete should employ the services of testing laboratories. Laboratory representatives should go to the job and explain their methods to the contractor in order to be certain of obtaining uniform test procedures. One individual should be made responsible for making all test cylinders under the direction of the testing laboratory. Variations in strength of concrete reflect on the industry and his suggestions with regard to test procedures were to minimize such results.

The industry has become increasingly complex, said Mr. Shelby, and must become familiar with the various admixtures and be able to answer questions intelligently on the subject of concrete. It is important that producers have qualified technicians in order to design mixes to yield uniform strengths and slumps and for control of yield. He believes that the various courses being given on the subject of concrete are excellent sources of needed information and should be used to advantage. Since increasing amounts of ready-mixed concrete are going into state work, he believes that highway engineers are in need of development and should be cultivated. Pointing to the fact that the industry lost about 700,000 cu. yd. of concrete in 1952 due to shortages of cement, he urged that purchasing policies be reviewed to take into consideration shortages and other factors in order to arrive at some reasonable plan to guarantee deliveries of all needed materials. In closing, he said that the producers who deliver a uniform, high quality product at a fair price will continue to expand and be a credit to the in-



From left to right: C. W. Shirey, C. W. Shirey Co., Waterloo, Iowa; Quinten Best, Consolidated Rock Products Co., Los Angeles, Calif.; and Cornelius N. Ray, Ray Industries, Inc., Detroit, Mich.



Left to right: S. H. Moore, B. C. Courtney, Jr., and W. W. Kemper, Jr., all of San Diego Transit Mixed Concrete Co., San Diego, Calif.

## **Labor Relations**

THE PITFALLS TO BE ENCOUNTERED in arbitration were brought out in a talk, "Use of Arbitration in the Resolution of Labor Disputes," by Herbert G. Jahncke, Jahncke Service, Inc., New Orleans, La. Mr. Jahncke's talk was largely built around a recent instance when his company submitted a dispute on wages to arbitration and the company lost.

As he pointed out at the outset, the medium of arbitration has been used only a few times in the industry and should be avoided whenever possible, because the arbitrator has the power to make final and binding decisions which might take any course. When mediation fails, arbitration is the usual next step whether the dispute involves terms in a union contract or where there is no contract or the point of dispute is not covered.

In the case of Jahncke, a union contract has been in effect, with provisions unchanged since 1938. Truck drivers have been unionized for many years, the contract being with the International Brotherhood of Teamsters (AFL). Rates under this contract are established annually and are lower than those for drivers of the construction industry in the area, the reasons being that the company provides steadier employment than the construction industry and has provisions for sick leave, seniority and other benefits. The difference in rates has amounted to 23 cents as well as differences where overtime work is involved.

In March, 1951, the company was the successful bidder to supply readymixed concrete for the new Kaiser aluminum plant. The plan was to erect a plant on the construction site but to deliver concrete from a plant ten miles away until the new one was built.

The union decided that the construction hourly rate should apply to the new plant, but the company had based its bid on the lower rate and went ahead with its plans. At the time, negotiations were underway for a renewal of the union contract. The company came to an agreement

allowing a small increase in rates, but the union later charged the company with fraud.

The first payday after the plant was started, the union notified the company that a strike was called and that picketing would begin. The Kaiser Co. cooperated fully with Jahncke Service.

An agreement was reached that the dispute would be settled by arbitration and the strike was called off. Advice from the Washington office of N.R.M.C.A. was that the points of dispute be definitely listed in writing before entering arbitration. The company agreed that the decision of the arbitrator would be final and also agreed that arbitration should be conducted in conformance with rules of the Louisiana courts.

Three names were made available from which a selection was made. The company struck off one, the union a second, and a professor of law at Tulane University was thereby selected to arbitrate the case. A 9-hr. hearing was held and the point of argument by the company was the terms of the contract in effect. The company also showed that it had erected plants under similar conditions in the past without such difficulties.

The union contended that there was a geographical line of demarkation involved and took the position that there would have been no argument had the plant been barely off the construction site.

A decision was handed down in favor of the union, that the plant was in effect part of the construction industry at least temporarily.

Mr. Jahncke said that there never would have been an agreement by his company to submit the dispute to arbitration except that negotiations had broken down and a strike was involved. Arbitration is to be avoided whenever possible, he cautioned, because unions have the advantage, and sympathy usually leans toward the worker.

If arbitration turns out to be the last course, he recommended that a competent attorney be engaged be-

cause the unions have experts. However, he said that a company can do more in its own defense than any paid labor relations expert can. Important suggestions were that an agreement be drawn up in advance of arbitration stipulating the issues in dispute to avoid drawing in side issues, and that careful attention be paid to selection of an arbiter. A single arbiter is preferred.

Discussion brought out that a western producer of ready-mixed concrete has a similar situation pending, involving an army airbase.

Following Mr. Jahncke's talk, the main points from a paper, "Group Bargaining with Labor Unions in the Lake County (Indiana) District," by George H. Maywald, Lake County Ready Mixed Concrete Association, East Chicago, Ind., were covered by executive secretary V. P. Ahearn in Mr. Maywald's absence. In this case a dispute was submitted to arbitration and the arbitrator—a professor from Northwestern University—decided in favor of the producers.

Until 1948, the ready-mixed concrete companies in Lake County, Ind., bargained separately and the individual companies had some bad experiences. The association was formed for the purpose of negotiating all labor contracts for its eight members which included all companies in the county. Mr. Maywald was appointed chairman of the negotiating committee at the time the first industry contract was to be drawn up with the teamsters union. Rates were standardized and working conditions standardized. The contract was completed and signed in October, 1949, each member being a signer, and it was to run for two years with the right of either party to open it for wage rate purposes only after one vear.

In April of 1950, the union served notice that it wanted to open the contract and Mr. Maywald was appointed sole negotiator for the companies. After reaching an impasse, the union showed its hand, which was to divide and conquer, by calling the employees of Lake Cities' Corp. off the job. Previously, the unions had been informed that an association contract was being bargained and it was made clear that if one plant be struck, the employers would consider it a strike against the association which would then act accordingly. When the strike at one plant was called, all plants were ordered shut down. The union negotiator termed this action a lockout and called in the U.S. Mediation Service. The association offered an 11 cent per hour increase across the board with all of the terms of the old contract but the union countered with demands for greater increases and

other working condition changes.

After much bickering, the union agreed to settle for a final offer made by the association which called for a 19 cent increase without vacations, and a two-year contract to expire

June 30, 1952, was completed. This contract, like the earlier one, provided that in the event of any new federal or state legislation or other developments of significance to the contract that both parties agreed the contract would automatically be opened for negotiation.

Shortly thereafter, demands started for guarantees of hours of work not provided for in the contract, again focusing on a single company. Following the 1951 directive of the president of the United States freezing wages, the union served notice to each employer that it wished to open the contract. Following a clarification of this directive from the N.R.M.C.A. office in Washington, the association informed the union that it had no right to open the contract until June 30, 1952, because of the president's directive.

After several conferences on the question, the union requested arbitration on the point and also demanded a guaranteed number of hours of pay for each employe. The union was asked to put the grievance in writing for the purpose of arbitration. Professor Willard Wirtz of Northwestern University was settled upon as the third arbitrator and the association retained the law firm of Covington and Burling (N.R.M.C.A.'s counsel) to represent it. Arbitration was in favor of the companies in both points of dispute.

It wasn't long afterwards, that the union made extreme demands for the workers and stated that they did not want to sign any more association contracts but wanted individual contracts.

Not being successful in the new demands, one company plant was struck and the association shut down all its plants. Then, the unions sent telegrams to all plants but the one struck, assuring them that they would not be struck without ample warning and that the employees wanted to continue work.

The reply to the telegrams stated that the employers reserved their right to equality of bargaining power and to the use of the "temporary lockout." It further stated that the strike against one member was considered a strike against all and that workers were temporarily laid off and would not be discriminated against. There was ample proof that the entire tactics of the union were to divide and conquer in this case. It was finally settled for reasonable concessions on the part of the employers but leaving the association's position intact on its right to bargain collectively.

As Mr. Ahearn summed this case up, the unions had sought to break up the employer front and had drawn the name of one company out of a hat as the one to be struck. The group stood firm. Unions do not like area bargaining of this kind, said Mr. Ahearn, and employers should stand firm in area bargaining unless the practice should be declared illegal. He

cautioned that producers never agree to arbitration on terms of a new contract and said that there are times when a strike is the best solution to a dispute. The Lucas bill pending in Congress would make it illegal and the national association intends to oppose its adoption.

## Group Insurance

Donaid Shepherd, John Hancock Mutual Life Insurance Co., Boston, Mass., discussed in detail the comprehensive group insurance plan to be made available for members of the National Ready Mixed Concrete Association. This plan will give all employers who sign up for it a low-cost program, where such employers are not otherwise qualified to have the benefits of mass purchasing power and economical coverage for employees.

The advantages of such a plan are many. No medical examinations of employees are required and employers can be saved the expense of helping workers' families in the event of death. The plan, if fully taken advantage of, has great potential in increasing employee morale, efficiency and stability. It would be administered by the N.R.M.C.A. and would supersede efforts of unions to institute their (the unions) plans.

The comprehensive plan provides medical, sick and hospital benefits, insurance, hospital and surgical expenses and also provides for accidental death for each covered employee. It may be extended also to provide the same benefits for dependents of employees with the exception of insurance and payments for death and dismemberment.

As Mr. Shepherd pointed out, the teamsters' unions are trying to force their own programs on companies. He compared such programs with that arranged for the N.R.M.C.A. through his company, pointing out the many differences in benefits paid. The N.R.M.C.A. plan compares very favorably in these respects and is much to be preferred in costs and other advantages.

As to costs, the teamsters' plan in a given area would require payment of 6 to 7½ cents per hour of work as compared to 2½ cents for the N.R.M.C.A. program covering employees only. With the latter plan, an additional 2% cents would cover dependents. In this regard, Mr. Shepherd said that benefits could be added in steps once the basic program is started, so that the employer will have the psychological advantage of progressively giving more advantages.

In the teamster plan, the employer has no control and there are no dividends payable to employers as a reward for good group experience. With the plan to start, the N.R.M.C.A. controls and administers the program, and dividends may accrue to employers, as costs may be lowered due to good experience. It is tailored for a single group whereas, in the union-



Walt Keeler of The Walt Keeler Co., Inc., Wichita, Kan., let us snap him

administered program, it is necessary to have union sanction and signature. Mr. Shepherd believes that the plan may be adopted on a cordial basis as far as unions are concerned. Billing and the settlement of claims, and all administration, would be handled in the Washington office of N.R.M.C.A. at cost. Claims could be settled on the very day they are received.

Mr. Shepherd requested that interested companies send in an application card, listing employees to be covered, the dependents to be covered and other needed information. Two months' premium is required upon application in order to establish a reserve in the Washington office, after which premiums are paid monthly. Such payments are deductible from taxes as a business expense and all of any class of employees for a given company must be included.

As Mr. Shepherd gave his talk, the minimum goal of 600 employees to be covered was being approached. Then the plan will be started and costs will be reduced as participation increases. Even if another plan be in effect in a plant, covered employees are eligible to this program.

A question brought out that all employees of a company are covered even if they be engaged in the production of sand and gravel and not ready-mixed concrete. The employer pays the premium for his employes, and the charge for employes' dependents may be paid by the employer or the employe. An employe may be carried even if he is on leave of absence or worked only a single hour.

#### Truck Mixer Tests

Stanton Walker, director of engineering for both associations gave a report on the progress of the truck mixer tests which are being run. He started by saying that during 1952 some 50-million cu. yd. of concrete were processed annually by truck mixers and agitators which accounted for about 20 percent of all the portland cement used in the United States. This volume came from over 3000 plants in the United States.

The truck mixer tests are a joint



Left to right: Andrew F. Bieker, Bieker Co., Inc., Hammond, Ind.; J. W. Roberts, Southern Materials, Inc., Richmond, Va.; and W. W. Duncan, Clark Certified Concrete Co., Inc., Baltimore, Md.

venture of the association and the Truck Mixer Manufacturers Bureau and are still in progress. The speaker reported on the progress made during 1952. These tests are very extensive; possibly the most comprehensive ever made.

The tests, involving many different truck mixers, were designed to secure basic information on such fundamental variables as rate of mixing, amount of mixing and size of batch. The aim was to not only secure well mixed batches but poorly mixed batches as well so as to furnish operating information.

Mr. Walker described the methods of batching and mixing and the methods of testing and, in the discussion of test results, said the results afforded convincing evidence that specifications for the operation of truck mixers was on a sound basis. The rate of mixing, he said, was of minor significance, it being the number of revolutions that counted. He said that concrete that looked well-mixed to the eye was certainly proved by the test to be well mixed. The rate of mixing, he pointed out, was of little or no significance as far as strengths were concerned. He said that neither fast nor slow mixing produced any superior results.

Extensive tests were carried out with truck mixers loaded to capacity and with various overloads. He said that overloads up to 11 percent of the mixer rated capacity showed that the mixers operated as well as when loaded to capacity insofar as mixing. slump, and gradation were concerned but there could be a slight loss in strengths. He felt that a 11 percent overload was the top limit as far as general efficiency was concerned. When overloads in the 17 to 44 percent range were tested, uniformity of strength and composition were materially reduced, the speaker said. The tests on amount of mixing indicated that 50 revolutions were adequate and an optimum figure for rated capacities but if the truck is slightly overloaded or an unusually difficult concrete is being poured a slight increase

in number of revolutions can often be advantageous.

Studies were also made of prolonged mixing using air-entrained concrete. Mr. Walker's report was very voluminous and difficult to abstract into limited space. However, it has already been given wide distribution throughout the industry.

## **Equipment Purchasing**

Robert C. Shiely, vice-president, Guaranteed Concrete Co., St. Paul, Minn., gave a talk at a joint session on "How to Buy Hauling Equipment for Ready Mixed Concrete." speaker outlined the methods his company used to tabulate engineering and operational data on mixer and truck performance. These data, when assembled in the form of charts, showed where costs were out of line and where material savings could be affected. As an illustration, he said that time losses for his company's units was 0.3 percent of the total but that this figure was reduced 60 percent by acting on the basis of information that the data revealed. He cautioned against having too large spare parts inventories. He showed movies of tandem drives used on Ford, International, and White trucks. These movies were mainly rear-wheel



Stephen Stepanian, Arrow Sand and Gravel Co., Columbus, Ohie, left, with Marshall L. Smith, Black Point Aggregates, Inc., San Rafael, Calif., a new sand and gravel pro-

shots of tandem wheel action in sandy soils.

#### Inspection

The last paper in the joint session on specifications was "Inspection of Aggregates and Ready Mixed Concrete" by J. W. Kelly. Professor of Civil Engineering, University of Cali-fornia. Mr. Kelly had formerly been associated with both the National Sand & Gravel Association, and the Portland Cement Association. He said that the human problem was now the most important phase of concrete technology. He dwelt on the general subject of adequate sampling and outlined A.S.T.M. procedures. He felt that such tests as slump tests could vary with personnel and that the ball penetration test was not so variable.

#### Safety

Following election of officers in the final meeting was the presentation of the Pit and Quarry safety trophies. The trophy for the Class "A" group was awarded to the Fisher Lime & Cement Co., Memphis, Tenn., and was accepted by W. S. Walters. The Class "B" trophy was won by the Morse Sand and & Gravel Co., Inc., Attleboro, Mass., and was accepted by Alfred H. Morse. The Class "C" trophy was won by Thomas, Bennett & Hunter, Inc., Westminster, Md., and was accepted by William B. Thomas.

Mr. Walters outlined some of the steps his company had taken towards safer operations. He said that top management had an active part in safety. Signs on trucks and in the yard were helpful. Mixer truck drivers avoid school areas as well as dangerous intersections even at the expense of a longer haul. He said that physical examination of employees was required and that all accidents were thoroughly investigated. Monthly safety meetings are held and every third one is a dinner meeting. Safe workers are rewarded and unsafe ones are penalized, he said. He quoted figures to show that substantial monetary benefits were derived during the past several years because of good accident experience.

Mr. Morse outlined some of the steps his company had taken towards safer operations. He said the company's safety program started in 1951 and that traffic signs were obtained from the local police department. He said that he had no sales force and that driver courtesy paid off as a good substitute. Safety consciousness has resulted in better attention being paid to equipment, he said, and as a result maintenance has been reduced 12 percent and compensation payments reduced 24 percent. He said that 40 percent of his business was for private housing so that the avoidance of accidents was essential and that low property damage resulted.

Mr. Thomas, in his acceptance, called on his native wit. Good fortune, he felt had a large part to do with his winning a trophy.

## **Cement Supply Situation**

A ROUND-TABLE DISCUSSION of cement supply for 1952 and 1953 concluded the meeting. William Moore, J. P. O'Connell Co., Boston, Mass., in reporting for his area, said that substantial business losses had been incurred by many companies because of inability to get cement. He said that New York's Thruway was draining portland cement away from New England and that 5,000,000 bbl. will be used on the Thruway. Portland cement plants in his area have increased their production 8 percent but allocations to ready-mixed concrete plants will be reduced, he felt.

Norman J. Fredericks, Koening Coal & Supply Co., Detroit, Mich., said that in his area 100,000 cu. yd. of ready-mixed concrete was lost because of the cement shortage in 1952. Strikes cut into cement supplies, and errors in estimating needs aggravated the problem. He said that the Ohio Turnpike was going ahead faster than expected and that this construction would drain off much of the cement supply in 1953. He said that four new cement kilns went into production recently in his area but that the outlook for 1953 still looked critical

John D. Kling, The Cleveland Builders Supply Co., Cleveland, Ohio, said that Cleveland was in the same boat as Detroit and that producers in Ohio lost 179,000 cu. yd. of concrete because of the cement shortage. Cement production fell off 5 percent due to strikes. Some cement had been brought in from out of area points but at higher costs. No change in the general picture is indicated for 1953, he said.

William J. Hicklin, Jr., Capitol Concrete Co., Jacksonville, Fla., reported for the Florida area. He said that his area had been troubled with cement shortages for 5 years and that in 1952 the situation was acute. Birmingham, Ala., cement is not shipped into his area because of new cement plants that are closer. Off-shore cement from Germany and Belgium as well as from Puerto Rico has been shipped into Florida. He said that 1,000,000 barrels were received from such sources during 1952. He said new production will amount to 1,400,000 bbl. for 1953. The state will use an estimated 10,000,000 bbl. of cement in 1953.

Herbert G. Jahncke, Jahncke Service, Inc., New Orleans, La., said that the New Orleans area would have no cement problems in 1953 because of the new plant of Ideal Cement Co. at Baton Rouge, and the Marquette Cement Manufacturing Co.'s new operation at Brandon, Miss.

#### **Industrial Radio**

The problems in obtaining and maintaining industrial radio were outlined in a talk by Frank B. Hagan, Graham Brothers, Inc., Los Angeles, Calif., a firm which has been making effective use of industrial radio since first licensed in 1947. Mr. Hagan's talk and the experiences of his company were of great interest, since the use of industrial radio in the two industries has become widespread and its advantages proven. Restrictions by the F.C.C. on its use have hampered its most effective application and, as Mr. Hagan gave his talk, efforts were being made by the two associations before the F.C.C. to have more widespread and unrestricted use of industrial radio made available to the two industries.

Graham Brothers, Inc., has some 400 employes, with producing plants at several locations including Catalina Island, and batching and distributing plants at scattered points in the Los Angeles and surrounding

area. The company has 65 mixer trucks, operates 6 scows and has some 30 materials trucks in service. Authorization for industrial radio was granted in August, 1947. Maximum distance is 50 air miles from the radio sending station. The license was extended in August, 1948 and the company was ordered to cease operations in November, 1948.

New restrictive regulations had created serious problems. New rules required that the primary functions be production and construction as distinguished from service or distribution activities and further limitation was that industrial radio be limited to use in remote or sparsely settled areas, for construction of public character and within the limitations of a single plant.

The company fought to retain its eligibility and submitted a strong case based on perishability of the product, lack of telephone facilities, and the fact that the public interest was being served.

Its experience with industrial radio since being permitted to continue, has been favorable. Its use has been effective in saving time, personnel and in improved efficiency. It has permitted an interchange of spoken words between the radio-telephone transmitter and mobile units in vehicles and between operators of mobile equipment.

The company has been authorized to have 25 mobile units (23 in use) and a central transmitter which is based at Monrovia, five miles from El Monte at an altitude of 13,000 ft. Mobile units are in vehicles of supervisory personnel. Among the advantages have been rapid transmission of technical information, of specification changes, the ready handling of emergencies, including mechanical breakdowns and order changes, savings in losses, quick adjustments where failures have taken place at the delivery end, quick adjustments to concrete mix proportions and many others.

Cost of the main station was \$1500 and, for the mobile stations, \$600 each. Maintenance cost has averaged \$25 per month per unit. Cost has been more than offset by the many advantages enumerated and much improved customer relations. The breakeven point, according to Mr. Hagen, requires a minimum of 5 mobile units.

Compliance with the many restrictions has proved difficult, and operation in Los Angeles county with its heavy population and many populous outlying areas has been complex. Mr. Hagan believes that the F.C.C. will continue to be interested in having the two industries eligibile to use industrial radio if the public interest be served and he said that producers should not be discouraged at the restrictions imposed.

As he closed, he said that he had just received word that new regula-

Morse, A or Lime Bennett

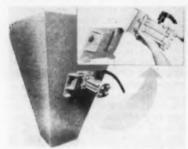


Trophies for winning the N.R.M.C.A., safety competition were received by Alfred H. Morse, Morse Sand and Gravel Co., Inc., Attleboro, Mass., left (Class B); W. S. Walters, Fischer Lime and Cement Co., Memphis, Tenn., center (Class A); and William B. Thomas of Thomas, Bennett and Hunter, Inc., Westminster, Md., right (Class C)

## **NEW MACHINERY**

## Air Vibrator

CLEVELAND VIBRATOR Co., 2828 Clinton Ave., Cleveland, Ohio, has announced development of the LSRR, a 2-in, piston diameter air vibrator. The



Portable air vibrator; closeup shows vibrator attached to bin

portable unit is used as a means of eliminating arching, bridging and sticking conditions in bins, hoppers, chutes, etc. The vibrator fits into the bracket on the bin and steps up the unloading of materials which have a tendency to pack down. It is often applied where one vibrator can serve several bins. The dimensions are: vibrator, 10 in. long, 5 in. high, and 51/2 in. wide, weighing 30 lb.; the bracket, 11 in. wide, 71/2 in. high and 216 in. thick.

## **Masonry Paint**

A ONE-COAT, WATER-REPELLENT COATING for exterior or interior surfaces of concrete masonry was recently announced by Tamms Industries, Inc., Chicago, Ill. Trade-named "Agraseal," the product is claimed not only to beautify masonry surfaces. but to save considerable time on every job. It is obtainable in 8-gal. cans, or in 25- and 100-lb. steel drums, from a selection of eight colors.

### **Gas-Oil Fired Boilers**

CLEAVER-BROOKS Co., 326 E. Keefe Ave., Milwaukee 12, Wis., has developed a combination gas- and oil-fired



Beiler fired with gas and oil

boiler which operates on gas, with oil burner in place, necessitating no mechanical or electrical changes to switch from gas to oil and vice versa. Flipping selector switch and turning fuel supply valves are claimed to complete the entire changeover in ten seconds or less. Other features include 4-pass construction and self-contained

## Sewer Joint Compound

THE PHILIP CAREY MANUFACTURING Co., Dept. SP, Cincinnati 15, Ohio, has started production of Sewertite,



Applying joint compound on tonque-andgroove pipe

a cold plastic sewer joint compound, which is designed to be waterproof, flexible, permanent and acid and alkali resistant. Bitumens, special additives, asbestos fibres, mineral stabilizers and solvents are combined to give the compound adhesive powers.

#### Concrete Mixer

WILLARD CONCRETE MACHINERY SALES Co., 11700 Wright Rd., Lynwood, Calif., is now producing a 6to 71/4-cu. yd. concrete mixer featuring a center gravity point which allows greater payloads while still maintaining legal distribution of weight on truck axles. Suitable for mounting on ten-wheel, 175-in. wheelbase trucks, its drum power is furnished by a transverse-mounted, 93 hp. Ford OHV industrial 6 and Ford power transmission assembly, with an overall gear



Truck-mounted concrete mixer of 6 to 712-cu. yd. capacity

ratio of 281 to 1. Charging and discharging hoppers are designed with large collection areas, and front-mounted pedestal and tank combination carry 90 gal. of water with outlets for mixing and washing. A %-in. gear-type water pump is driven by V-belt from mixer engine.

## Centrifugal Pump

CONSTRUCTION MACHINERY Co., Waterloo, Iowa, has announced production of "Dual-Prime," a portable, self-priming centrifugal pump, available with air-cooled engine power in sizes ranging from 11/2 in. through 4 in. The self-priming feature utilizes the sweeping action of the liquid to clean and remove solids from the pump case. A greaseless rotary shaft seal is used at the point where the rotating impeller shaft enters the pump case, and it is protected from abrasive particles by a hydraulic seal at the impeller rim. The pumps are furnished mounted on rubber tired wheels or on a skid-type base.

### Fork Lift Trucks

YALE & TOWNE MANUFACTURING Co., Philadelphia Div., 11,500 Roosevelt Blvd., Philadelphia 15, Penn., has made its fork lift trucks in capacities from 4000 to 10,000 lb. available with either gas or diesel power plants. Because of a new design standardization program, either type power plant can be installed in the same size chassis. The manufacturer claims this permits wider flexibility in the application of fork lift trucks where operating conditions and available fuel indicate a definite preference for one type or the other.



Either gas or diesel engine can be installed in this fork lift truck

## **Pipe Industry Discusses**

## TECHNICAL PROBLEMS

Over 300 MEMBERS AND GUESTS attended the 45th annual convention of the American Concrete Pipe Association and its affiliated associations in Dallas, Texas from February 25 to 28, inclusive. The Specifications and Technical Problems Committee held a meeting with Bureau of Reclamation representatives on the day preceding the opening of the convention to discuss mutual problems. On February 25, the American Concrete Agricultural Pipe Association held a business session in the morning and an open session in the afternoon with Lewis H. Tuthill, concrete engineer, and Howard G. Curtis, chief, Canals Section, Bureau of Reclamation, Denver, Colo., as the principal speakers. The American Concrete Pressure Pipe Association held its meetings on February 26. The American Concrete Pipe Association held a business session in the morning of February 27 with an open session in the afternoon with the following speakers: Lorenz G. Straub, director, St. Anthony Falls Hydraulic Laboratory, University of Minnesota; R. R. Litchiser, chief engineer, Testing & Research Laboratory, Ohio Department of Highways; and Howard F. Peckwork, managing director, American Concrete Pipe Association. The jam sessions on technical and operating problems were held on February 28.

Texas lived up to its tradition of southern hospitality by a fine program of entertainment. In addition to special entertainment for the ladies, there were two cocktail reception parties in the evening, the Texas Party and Barbecue which will long be remembered, and the banquet on February 28. Some outstanding speakers addressed the luncheons. S. W. Freese, consulting engineer, Freese and Nichols, Fort Worth, Texas addressed the American Concrete Pressure Pipe Association on the "History

## American Concrete Pipe Association and affiliated associations hold annual conventions in Dallas, Texas

of Concrete Pressure Pipe in Texas." He said that concrete pressure pipe has become firmly established in Texas. His paper described in considerable detail the development of pipe joints. Dr. Arthur Smith of the First National Bank in Dallas, in his talk on February 27, gave his views as to business prospects for the next two years. He expressed the opinion that the inflationary spiral would be arrested. Cayce Moore, humorist and philosopher, was the speaker on February 28.

#### **New Officers**

Officers elected by the American Concrete Pipe Association are: president, Ivy H. Smith, Sherman Concrete Pipe Co., Jacksonville, Fla.; vicepresidents, Harry W. Heath, Lock Joint Pipe Co., East Orange, N.J.; Carl A. Bluedorn, Zeidler Concrete Products Machinery Co., Waterloo, Iowa; and A. W. G. Clark, B.C. Concrete Pipe Co., Ltd., Vancouver, B.C., Canada; secretary, D. W. Decker, Mid-West Concrete Pipe Co., Chicago, Ill.; and treasurer, J. D. Mollendorf, Continental Concrete Pipe Co., Chicago, Ill. Directors elected until 1956 are: Peter Van Kuren, American Pipe and Construction Co., Los Angeles, Calif.; R. B. Carroll, Sherman Concrete Pipe Co., Inc., Birmingham, Ala.; and R. A. Norman, North Dakota Concrete Products Co., Bismarck,

The American Concrete Agricultural Pipe Association elected the following: president, J. Walter Porter, Gifford-Hill-Western, Inc., Dallas, Texas; vice-president, R. W. Liston, W. T. Liston Co., Harlingen, Texas; secretary, G. F. Lillie, Platte Valley Cement Tile Manufacturing Co.,

Scottsbluff, Neb.; and treasurer, W. B. Freeman, Lock Joint Pipe Co., Denver, Colo. New directors are: the officers; R. R. Reynolds, Van Cleve Construction Co., Exeter, Calif.; and G. D. Williamson, Valley Concrete Pipe & Products Co., Yuba City, Calif.

The American Concrete Pressure Pipe Association elected the following: president, Ray A. Foley, Gifford-Hill-American Inc., Dallas, Texas; vice-president, P. R. Hirsh, Lock Joint Pipe Co., East Orange, N.J.; secretary-treasurer, Harry S. Price, Jr., Price Brothers Co., Dayton, Ohio. Directors are: the officers, and E. L. Johnson, Concrete Conduit Co., Colton, Calif.; and R. V. Edwards, American Pipe and Construction Co., Los Angeles, Calif. Howard F. Peckworth, managing director, American Concrete Pipe Association, was reelected to the same post in the affiliated associations as well as the parent association.

## Technical Items Relating to Concrete Pipe and Specifications

Lewis H. Tuthill of the Bureau of Reclamation, in his paper on "Some Technical Items Relating to Concrete Pipe" suggested ways in which concrete pipe manufacturers could meet tests and reduce pipe rejections. He also presented slides of graphs showing results of pipe tested under varying curing conditions. These tests pointed to the dangers involved in steam curing temperatures exceeding 200 deg. F. Slides also showed the need for close control in the use of calcium chloride in the mix during winter months. An amount exceeding 2 percent tends to reduce strength long after the 28-day curing period. Other points of caution which he raised involved excessive vibration, particularly in the case of air-entraining cement in the mix. In laying pipe, care should be exercised in "buttering" joints with mortar. Pointing of the joint should be deferred until such time as the pipe would not be disturbed. Back-filling, he thought, should be done immediately after pointing, but the inside of large pipe should not be pointed until later. Jetted and vibrated back-filling was recommended. An equivalent of 92 percent density with free-draining material should be considered good prac-

Howard G. Curtis of the Bureau of Reclamation reviewed the new spe-



American Concrete Pipe Association board of direction. Left to right, standing: H. E. Eschenbrenner, Jr.; T. E. Arp, A. W. G. Clark, G. H. Redding, Louis F. Dolch, R. B. Carroll, C. J. Kelly, Howard F. Peckworth, and Peter Van Kuren. Seated, left to right: O. H. Miller, J. D. Mollendorf, Harry W. Heath, Ivy H. Smith, G. D. Williamson, Carl A. Bluedorn, A. B. Metcalf, and D. H. Decker



American Concrete Agricultural Pipe Association board of direction. Standing, left to right: R. W. Liston, R. R. Reynolds, G. F. Lillie, and Howard F. Peckworth. Seated, left to right: G. D. Williamson, W. B. Freeman, and J. Walter Porter

cifications of the Bureau covering three types of design for hydrostatic heads of 50, 75, 100, 125 and 150 ft. Concrete mixes, under these specifications, are to be designed on the basis of attaining a strength at 28 days of at least 3500 p.s.i. for centrifugally spun pipe and 4500 p.s.i. for pipe manufactured by placing and vibrating methods. The specifications now provide that the contractor furnish a warrant and maintenance bond in the amount of 5 percent of the total contract price which will be effective for a period of three years after final acceptance by the government. In the discussion which followed it was mentioned that a meeting with Bureau representatives is scheduled for October this year, and it was suggested that meetings be scheduled twice a

#### Improved Culvert Design

Lorenz G. Straub of St. Anthony Falls Hydraulic Laboratory, University of Minnesota, told about the research activities of the laboratory "Toward Better Design of Hydraulic Culverts." His talk was illustrated with slides and a moving picture. Inlet design, he said, has a very important bearing on culvert capacity. For a given head, a culvert may have only half the capacity if it has a bad entrance. A good exit design improves capacity and reduces erosion. The entrance has been the control which determines the capacity when the inlet was square-edged. A simple rounding of the entrance permits the line to flow full, shifting the control to the friction loss in the barrel of the conduit. The moving picture and slides of laboratory tests clearly demonstrated this result.

#### Testing Concrete Pipe In Ohio

R. R. Litchiser of the Ohio Department of Highways described laboratory facilities and methods in his talk on "Ohio's Experience in Testing Concrete Pipe," which was illustrated with slides. In 1951, the laboratory tested 759 samples of pipe and tile as compared with 783 samples in 1952. About two-thirds of the samples tested were concrete pipe. To minimize delay, the laboratory maintains inspectors at the sources of supply of materials used in large quantity so that they may be sampled and tested in advance of shipment. Shipments are made from tested materials either under the supervision of the inspector or upon certification of the producer. The latter practice is usually followed in the case of concrete pipe.

Howard Peckwork, managing director of the American Concrete Pipe Association, presented his views on "The Importance of Quality and Proper Installation of Concrete Pipe Lines" which he illustrated with slides.

## Technical Problems Discussed at Jam Sessions

J. J. Seale, president, Valley Concrete Pipe and Products Co., Yuba City, Calif., was moderator at the morning jam session. He was assisted by a panel comprising John H. Bailey, The Cretex Companies, Inc.; Craig J. Cain, Continental Pipe Corp.; A. W. G. Clark, B.C. Concrete Co. Ltd.; Harry W. Easterly, Jr., Concrete Pipe and Products Co.; Wm. B. Freeman, Lock Joint Pipe Co.; Elmer Leuliette, Universal Concrete Pipe Co.; Tom Thomas, Thomas Concrete Pipe Co.; Carl A. Warren, Spokane Concrete Pipe Co.; Henry A. Weigand, United Concrete Pipe Corp.; and Craig Cain, Continental Concrete Pipe Co.

On the question of combating competition from transite pipe, Craig Cain said that it is more expensive than concrete pipe. E. F. Bespalow said it is not competitive with sewer pipe as it will not stand freezing or thawing. It is all right for water mains, but will lose out to cast iron pipe when it becomes more plentiful. Ivy Smith said that trouble is experienced with transite from workmen puncturing it with a pick.

To jack pipe in sizes of about 12 to 18 in., J. J. Seale used a creeper platform on wheels to go into 18-in. pipe. On larger pipe, he drilled into the pipe. Mr. Bespalow reported he used an ordinary post-hole digger when jacking pipe under a highway.

The question of the desirability of having available wire mesh exceeding the present 0000 size on 2-in. spacing was brought up. Manufacturers' representatives reported, however, that it would be impractical as far as handling and it would have to be made to special order.

On the question of jacking pipe and the preparation of pipe joints, Elmer Leuliette said they use a jute filling material to insure even distribution of pressure around circumference of the joint when jacking. Mr. Bespalow uses an asphaltic mastic at joints while jacking, and extra strength pipe are used on all jacking operations. Mr. Leuliette has jacked 60-in. pipe a distance of 189 ft., using 300 lb. pressure per sq. ft. of exposed surface. Mr. Miller reported the use of an air hose with bentonite and water as a lubricant. H. A. Wiegand said that extra reinforcing should be provided to help to take up the thrust from jacks when jacking a long distance.

H. W. Chutter said that the A.S.T.M. C-14 fill test should be made on all small pipe as it is economical.



Bureau of Reclamation representatives at the meeting. Left to right: Howard G. Curtis, chief, canals section; Frank E. Rippon, assistant chief, canals section; and Lewis H. Tuthill, concrete engi-

The test period is now 24 hr. Tom Thomas and G. F. Lillie emphasized the need for periodic checking of forms for cast pipe to see that they are not out of round. On the question of casting pipe outside during the winter, Carl B. Warren said that they had cast pipe in Montana using calcium chloride in the mix and steam under canvass supported by wire mesh to form a steam chest. John Bailey stressed the importance of watching temperature of mix, and steam heating is essential. Mr. Weigand said that they heated material bins, used hot water for mixing and calcium chloride. Mr. Tuthill of the Bureau of Reclamation said that when using calcium chloride it might be desirable to use a No. 5 cement which would resist a sodium sulphate test.

J. J. Seale reported that they used pneumatic tools to clean up mixers and around pipe machines. Mr. Powell used a small scraper attached to the blades to clean up mixer. On the question of making bends, Y's, and elbows, the Standard Concrete Products Co., Houston, Texas has developed a special machine for this purpose.

Mr. Tuthill said that lumnite cement is too fast setting for pipe manufacture. Mr. Denham reported that while there was no trouble in manufacturing pipe on a packer head machine, using a lumnite cement mix, the lumnite cement was not sufficiently resistant to acid to warrent its use. Mr. Tuthill said that the external type of vibration is the preferred method. It is desirable to have the concrete poured slowly into the form while the vibration is on, and the vibration should be turned off when concrete is not being poured. A vibration speed of 7000 to 10,000 r.p.m. is the desirable range. Mr. Bespalow uses four internal vibrators with up to 7000 r.p.m. vibration speed, and strength has been increased. Mr. Thomas reported the use of three internal and two external, one low and one higher up, to obtain a 6000-lb. test, using six sacks of cement to the cu. yd. Mr. Tuthill told about his experience with asphalt coatings to combat reactive soils. He suggested the use of No. 5 cement as preferable, using an additional sack of No. 5 cement with the mix. On the question of the use of pozzolans, Mr. Tuthill said that they combine with the free lime in the cement but they do not set up like cement.

Jim Stacker of Beaumont, Texas said that the pipe industry is overlooking markets, mentioning the oil refining industry as a good example. James Carnwath, Toronto, Canada, has sold very large concrete pipe as a sleeve for iron pipe. Mr. Thomas has sold concrete pipe for air vent returns in forced-air heating systems, and also 36-in. culvert pipe for wells. Mr. Williamson reported the sale of 130,000 ft. of porous concrete pipe for drainage. Mr. Chutter also had made 5-in. pipe on a machine, using coarse aggregate.



Panel at morning jam session. Left to right: Harry W. Easterly, Jr., Concrete Pipe and Products Co.; John Bailey, The Cretex Companies, Inc.; Carl Warren, Spokane Concrete Pipe Co.; Elmer Leuliette, Universal Concrete Pipe Co.; A. W. G. Clark, B. C. Concrete Co., Ltd.; J. J. Seale, moderator, Valley Concrete Pipe and Products Co.; Wm. B. Freeman, Lock Joint Pipe Co.; Henry Wiegand, United Concrete Pipe Corp.; Tom Thomas, Thomas Concrete Pipe Co.; and Craig Cain, Continental Concrete Pipe Co.



Jam session panel. Left to right: Peter Van Kuren, American Pipe and Construction Co.; E. F. Bespalow, Choctaw, Inc.; Scott Grivas, Black-Brollier, Inc.; J. E. Miller, Lewistown Pipe Co.; Carl A. Bluedorn, moderator, Zeidler Concrete Products Machinery Co.; W. I. Fleetwood, Gifford-Hill Pipe Co.; R. B. Carroll, Sherman Concrete Pipe Co.; and H. W. Chutter, Jourdan Concrete Pipe Co.

#### Afternoon Session

At the afternoon jam session, C. A. Bluedorn, president, Zeidler Concrete Products Machinery Co., served as moderator with the following panel: E. F. Bespalow, Choctaw, Inc.; R. B. Carroll, Shearman Concrete Pipe Co., Inc.; H. W. Chutter, Jourdan Concrete Pipe Co.; George B. Denham, Faulkner Concrete Pipe Co.; W. I. Fleetwood, Gifford-Hill Pipe Co.; Scott Grivas, Black-Brollier, Inc.; Peter Van Kuren, American Pipe &

Construction Co.; and J. E. Miller, Lewistown Pipe Co.

On the question of using a curing compound instead of water, Peter Van Kuren said that he had used it for joints. Mr. Curtis of the Bureau of Reclamation reported the use of a curing compound at the rate of 1 gal. per 150 sq. ft. of pipe surface. Dick Carroll said that they stamp pipe with a die or with wire on the outside. Herb Dickehut reported that time studies of operations did not pay.



Board of direction, American Concrete Pressure Pipe Association. Standing, left to right: E. L. Johnson, Howard F. Peckworth, and Harry S. Price, Jr. Seated, left to right: R. V. Edwards, P. R. Hirsh, and Ray A. Foley

## Selecting and Handling

## **AGGREGATES**

By JAMES A. NICHOLSON

7. A producer views the ready-mixed concrete business .

In the United States, many materials are used as coarse aggregate—crushed stone, crushed and uncrushed gravel, sea shells, blast furnace slag and other approved inert material.

Coarse aggregates are submitted to an accelerated soundness test and, failing to comply therein, to cycles of freezing and thawing. When used for certain purposes, the aggregates are subjected to an abrasion test (Deval machine or Los Angeles machine). Deleterious and soft particles are held to a low minimum, with a tendency to hold the total of such unsound material to a maximum of 5 percent. As a rule, slag is not subjected to an abrasion test, but must meet A.S.T.M. weight requirements. Absorption tests are frequently required and the tendency is to become more strict on this point-limiting the absorptive capacity to approximately 2

On his selection of coarse aggregate, the ready-mixed concrete operator must be governed by a number of factors: local practices and pre-

judices, economic availability, job specifications and conditions, customer preferences and other possible considerations. Good judgment is such a consideration.

In one metropolitan market, all operators feel they must handle slag, gravel and limestone concrete. At two operations, we use slag; at the other plants, we use limestone, (from different quarries). If one acceptable local material would be sufficiently available for use at all the plants, we would standardize on that aggregate. We believe that by standardizing, a more flexible operation is achieved and a more uniform, better quality concrete is produced.

In crushed gravel, particles are generally sub-cubic in shape. There is an absence of flat and elongated pieces which are sometimes bothersome in the more angular crushed stone. Slag, in over-all shape, is about half way between stone and gravel. Because of the differences in shapes, there are fewer voids in well graded gravel. Somewhat less cement paste is re-

quired and slightly higher compressive strengths generally develop. Due to the angular shape and texture of its aggregate, crushed stone concrete generally shows a somewhat higher tensile strength and may prove slightly more durable.

Gravel concrete has ready acceptance with most concrete workmen. It cleans out of the mixer easier and places more readily. Under comparative conditions, it is easier for the finisher to handle. Crushed stone always has been widely used as a coarse aggregate. The added plasticity of air entrainment has furthered the acceptance of manufactured sands and now, in many localities, crushed stone is used as both fine and coarse aggregate.

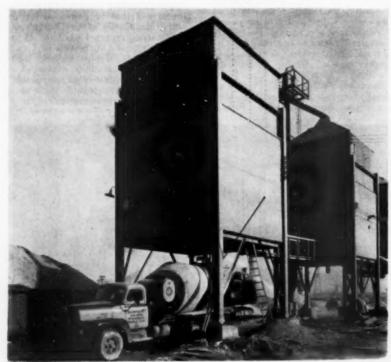
Slag and other porous aggregates are more harsh and difficult to control because of changing specific gravity and a tendency to absorb moisture. In the field, slag tends to float and this irritates the finisher. On the other hand, there is less danger of the presence of unsound deleterious particles.

As with other aggregate, air entrainment has done much for the successful use of slag as concrete material. The added plasticity of the airentraining mortar answers the problem of harshness. The greater cohesiveness of air-entrained concrete eliminates the nuisance of floating particles, formerly quite troublesome in finishing operations. New plant controls adequately handle the matter of specific gravity variations. The recent trend toward central mixing and the advent of air entrainment have combined to push slag to the front as a perfectly satisfactory aggregate in concrete. Such developments have likewise helped to further the use of other porous materials.

In the early days of pumping concrete, greatest efficiency was obtained with the more workable gravel concrete. Now, with the use of air entrainment, the pumping of crushed stone and slag concrete is a common, successful practice. The presence of air is so important that air-entrained concrete, using either slag or crushed stone, will pump better than regular gravel concrete.

## Grade Up to Largest Top Size

Coarse aggregate should be graded up to the largest top-size that is practical for intended job use. Specifications for any given top-size aggregate



One of the more recently built Chicago area ready mixed concrete plants. Bins for aggregates, cement and batching plant are in a straight line

require that the material to be used contain a given percentage of a number of sizes, from the smallest required stone to the specified top-size. Within any given range, a well graded aggregate contains a proper proportion of all sizes without an excess or deficiency of any one size.

Gradation ranges for concrete mixes regularly handled by the readymixed concrete industry have been covered by a table recognized by A.S.T.M. (C 33-49) and the Bureau of Standards (Simplified Practices).

be used on unreinforced slabs and reinforced walls, beams and columns. Following such a pattern, probably a majority of ready-mixed concrete producers use 11/2-in. top-size aggregate in their regular concrete. Many operators use such top-size aggregate without separating it into two sizes. Some producers even use 11/2-in. aggregate that is only sized, neither graded nor separated.

In the "Standard Practices" issued by The American Concrete Institute for Design of Concrete Mixes, (A.C.I.

regular concrete could be economically and effectively placed. They would probably say that all contractors would call for a higher slump and that many inspectors would grant such a request.

In the case of this illustration and the kind of construction generally serviced by our industry (heavy slabs, walls and beams excepted), it is important that the concrete be plastic. There should be sufficient mortar and enough room to permit the pieces of coarse aggregate to move relative to one another. If 1-in. topsize aggregate was used in the illustration, a lower slump concrete could certainly be placed more efficiently than a concrete in which 11/2-in. aggregate was used. There would be practically no difference in either water content or resulting compressive strength. There might be a great difference in the finished wall. Concrete processed with the smaller stone probably would be more uniformly compacted and there would be less segregation and "honey-combing."

The most desirable combination of aggregate particles that will give the required strength and workability with the least amount of paste should be used. Larger stone should not be used if higher slump concrete is necessary to get desired workability, plasticity and placeability. Larger stone should not be required if in its use considerable difficulty will be experienced in the efficient handling, depositing or placing of concrete in the forms.

It is economical and generally profitable to use the largest maximum size aggregate in the concrete that can be efficiently handled. It is impractical to use material that is poorly graded or has inadequate particle size. To take advantage of larger top-size aggregate, it is necessary that the material be well graded. To be certain that 11/2-in. down aggregate is properly graded, it is necessary to separate the material into two sizes. If the 11/2-in. material is poorly graded, there will be no control

National Bureau of		2 in.		Percentage Passing			
Standards	A.S.T.M. (C33-49)	Sieve	11/2 in.	1 in.	% in.	% in.	No. 4
No. 4	11/2 to % in.	100	90 to 100	20 to 55	0 to 15	0 to 5	
No. 67	% in. to No. 4	100	07 4- 100	100	90 to 100	20 to 55	0 to 10
No 467	1½ in. to No. 4	100	95 to 100		35 to 70	10 to 30	0 to 5
Note: Many	ready-mixed concrete	operators	gen- is	used, se	paration of	nizen is	preferred.

e: Many ready-mixed concrete operators generally use %-in. to No. 4 coarse aggregate. When larger top-size aggregate is required, they add 1½ in. to % in. to get a controlled 1½-in. to No. 4 grading. Some producers use only one stockpile of 1½-in. to No. 4 to 1½ in. When 1½-in. down material

Note: Aggregates meeting the medium values of these grading limitations would have the following fineness moduli: Size (1½ to ¾ in.) (¾ in. to No. 4) (1½ in. to No. 4) F.M.

There is general agreement between concrete authorities and specification writers that the coarse aggregate should be graded up to the largest size that is practical for the work to be done. C. E. Wuerpel has clearly stated his position as to maximum size of the coarse aggregate: "It is my belief that the largest maximum size of coarse aggregate usable in the section to be cast should be required and maintained. . . . Concrete after all is a man-molded stone and the use of a maximum of the natural stone and a minimum of the binder is a natural approach. It is unfortunate that there is a very strong and general tendency to use an inadequate size of coarse aggregate and consequently an inadequate quantity of coarse aggregate in concrete. This is a subordination of the ultimate quality of the concrete in the interests of proportioning and placing." Most authorities agree with these well stated views.

In mass concrete, such as dam construction, the use of 4-6 in. stone has become general practice. The holding of cement, sand and water contents to a minimum has been proved structurally and economically sound.

In heavy pavement concrete, the use of stone up to a maximum 21/2 in. size is generally good practice. Pavement concrete has many of the characteristics of mass concrete. Paving concrete is not required to be as workable as structural concrete. Paving concrete contains more coarse aggregate and less sand. It is of drier consistency with slumps as low as one inch. Pavement concrete requires no more sand than necessary to create a thin layer of mortar on the surface of the finished pavement and to provide only enough mortar below the surface to properly coat and bind the aggregate.

In structural concrete of 6-in. (or greater) minimum dimension, authorities and specification writers agree that 11/2-in. top-size aggregate should 613-44) an illustration is shown in which concrete is designed for use in both a pavement slab and an 8-in. heavily reinforced retaining wall. The design was based on a 3-in. slump concrete containing 11/2-in. top-size aggregate. In using this illustration, the committee was closely following A.C.I. recommended practice-to use the lowest slump compatible with proper placing; that the maximum size of aggregates should be as large as practical and available, but should not exceed two-thirds of the minimum clear distance between reinforcement.

In an 8-in. heavily-reinforced retaining wall, it would be the opinion of many ready-mixed concrete producers that 3-in. slump concrete with 11/2-in. top-size aggregate would produce a wall section in which the distribution and compaction of the hardened concrete would be far from uniform. These producers probably would agree that the use of % - or 1-in, topsize aggregate would be more practical in the illustrated 8-in. heavily reinforced wall. They would doubt that a 3-in. slump, 11/2-in. top-size



Large Chicago area plant designed for location in a limited area. Stockpiled materials along the river are sent to the batching plant by tunnel conveyor

over the yield and workability of the concrete. It is more sensible to put out a uniform quality concrete, using 1-in, top-size aggregate, than to put out an inconsistent 11/2-in. down product, that might give much better strength on one load but be unworkable on the next.

For top-size aggregate, use % - or

1-in, stone if:

(1) You are experiencing difficul-

ties in placing concrete.

(2) You have only one bin compartment to handle coarse aggregate. (3) Strength results easily meet specifications.

(4) You cannot buy aggregate separated into two sizes.

(5) You feel there is less chance of errors on deliveries.

(6) You can hold concrete within the required water-cement ratios.

Shift to 11/2-in. top-size aggregate

- (a) You are experiencing trouble in meeting strength specifications. (b) You do not fear difficulty in
- meeting placing requirements. (c) You have two or more compart-
- ments to handle coarse aggregate. (d) You are able to buy properly

separated, carefully graded aggregates. (e) You want to make full compen-

sation for the use of air entrainment. Note: Before leaving the subject of proper sizing, the reference to air entrainment in (e) should be explained. Because air entrainment greatly improves the plasticity of the concrete, it is possible to increase the range of sizes through which the aggregate particles are graded. This means that you are able to increase the maximum size of coarse aggregate, usable for any given purpose.

What checks do you have on your own fine and coarse aggregate? Do you maintain a file? Have you got basic information that can be made quickly available? What is the gradation of the sand?; of coarse aggregate? Do you have a chemical analysis? How well do the aggregates resist freezing and thawing? What is the soundness loss? How are they on abrasions? Do you have any facts on specific gravity and absorption? What are their fineness moduli? What are the percentages on unsound and deleterious material?

Important work may be coming your way. Are you ready?

### **Handling Aggregates**

The ready-mixed concrete operator who is able to purchase sound, clean, well graded aggregates is in a fortunate position. If in addition the operator is able to buy aggregates of a stable moisture content, he should experience little difficulty in processing uniform quality concrete. Such an operator has to worry only about handling procedures. Producers who are forced to use aggregates that run consistently coarse or too fine must adopt proper handling routines and must also make necessary adjustments to compensate for the aggregate deficiency. Operators who really have problems are those forced to use materials that jump all over the lot-one batch of aggregate too fine, the next too coarse; one batch of dry aggregate, the next of wringing wet material.

Sand is delivered to ready-mixed concrete plants by barge, rail and truck. Sand, when received, may be immediately usable or may require rehandling. Some sand may contain harmful amounts of organic matter or silt. Other sand may be poorly graded or part of the load may be dry, with the balance in a wet condition. For sand that is not immediately usable, corrective handling routines must be worked out and used.

At plants where harmful organic matter or excessive silt are sometimes present in the sand, the simple tests for organic matter and excess silt should be regularly conducted. Substandard sand should be blended in proper proportion with sand that meets specifications and these difficulties should be brought to the attention of the sand supplier.

The moisture problem begins with the processing operation and the method of delivery. Where consistently dry (about 5 percent moisture) aggregates are shipped, there is no

moisture problem.

If wet sand is transported by barge or truck, the sand will be received in a wet condition. When wet sand is shipped by rail, the length of time consumed for delivery generally eliminates the moisture problem. If dry sand, received by rail, is placed in the sand stockpile or overhead bins with wet sand received by barge or truck, you have a moisture control problem. Unless the sand that goes into the weigh hopper is of relatively stable moisture content, the concrete cannot possibly meet yield and workability requirements. If both wet and relatively dry sand (or coarse aggregate) are being regularly received, separate stockpiles should be provided. Only aggregate of a fairly consistent moisture content should be elevated to the overhead bins.

Whenever practical always try to receive aggregate in the same condition. If sand from a principal source of supply comes by barge in a wet condition, you should attempt to receive all sand in a similar condition. Wet sand should always be stockpiled and allowed to drain at least 40 to 80 hours. Even after several days' drainage, sand should only be taken from upper or middle storage portions. Stockpile sand generally varies greatly in moisture content. The upper portion sand may only contain 5 percent moisture while the bottom sand may be very wet, containing as much as 15 percent moisture. Bottom sand dries slowly. If possible, bottom sand should be rehandled. Before using, this sand should be cast into the upper portions of another stockpile.

Do not depend on overhead storage

alone if sand is regularly received in a wet condition or if loads fluctuate widely in moisture content. Similarly, the delivered condition of the sand may be a determining factor in your selection of handling equipment. If moisture content is a daily problem it probably would be wise to avoid the use of a tunnel conveyor system, or any method that necessitates removal from the bottom of a stockpile. If well-graded, moisture-controlled aggregates can be regularly purchased, the tunnel conveyor system is an ideal way to handle materials.

If there is a moisture variation problem, best results can be obtained by crane handling. Front-end loaders and bucket-loading machines always pick up some bottom sand. The crane operator can select sand from the drained portions of the stockpile and overcome the moisture problem of bottom sand by casting it into another

storage pile.

At our own operations, all sand is waterborne in a wringing wet condition. Barge shipments are placed in one of two stockpiles. In one stockpile, sand is permitted to drain several days, then used at the dock central mixing operation. Sand in the other pile is required to drain at least one week before removal by truck to one of the three area plants. The longer drainage period requirement is necessary because the material loader which charges the dump trucks picks up a certain percent of bottom sand.

A moisture determinant is of little use in a plant where successive batches in a weigh hopper vary considerably in moisture content. It doesn't make sense to determine that a given sand contains 5 percent moisture, when the next batch actually has a 15 percent moisture content.

To control the moisture content of aggregates, standardize upon method of delivery, receive material in one condition, select efficient handling equipment, stockpile all wet sand. place wet and dry sand in separate storage piles, rehandle all bottom sand, and elevate only well drained aggregates to overhead storage bins.

To process concrete of consistent yield and workability, see to it that moisture-controlled aggregates go into

your mixer or mixers.

Moisture control can also be a problem with coarse aggregate. One load of gravel may be dripping wet, the next relatively dry. Slag and other porous material call continuously for corrective handling. Only slag containing sufficient moisture, so that water will not be taken from concrete in transit, should be put into the mixer. Some slag, as received, is immediately usable. On occasion, hot driedout, water-absorbing slag, that has just been processed, will be delivered. Such material should be given a "wetting down" and be placed in stockpile for a "cooling off" period. Ground storage is essential in the proper handling of slag. Recently a good sized operator, who uses slag as

coarse aggregate, spent almost \$100,-000 in purchasing and erecting a new central-mixing plant. Unbelievably, no provision was made for ground storage.

### **Blending In Fine Sand**

The quality minded operator, in addition to providing clean sound sand of controlled moisture content, realistically faces the important problem of gradation. If he receives well graded sand from his supplier, by adopting proper handling routines, he sees to it that well graded sand goes into the weigh hopper. If he receives poorly graded sand he corrects the condition either in the stockpile or in conveyance to overhead storage. Such an operator has screening facilities to test gradation limitations of his own sand. He follows up sieve analysis tests by blending sand in such proportions as to bring gradation within satisfactory limits.

A producer using local sand that runs consistently coarse may have to "ship in" some fine sand. The fine sand should be placed in a separate stockpile. Whenever possible, this fine sand should have its own overhead compartment and should be weighed independently of the local sand. The blending of sand requires great care and constant supervision. When no extra compartment is available, the best possible blending job has to be done. Gradation ranges should be worked out for the two sands and every effort should be made to accomplish satisfactory proportioning.

When inconsistency of gradation is a problem, the solution is in more ground storage piles and in additional overhead compartments. Deliveries must be carefully supervised. Loads or parts of loads that are on the fine side should go into the fine sand stockpile. Coarse loads should be placed in another stockpile. Gradation averages should be determined for each stockpile. If required overhead compartments are available the two sands should be weighed out to produce a blended sand that meets specifications. If such facilities are not available a blending operation at the stockpile must be attempted.

We use a marginal sand at our Toledo plants that is of inconsistent gradation. Our sand varies considerably between loads and between parts of the same load. Part of each load generally is on the coarse side; much of it is too fine. To meet specifications all of it must be rehandled; some of it must be blended, even reblended.

Chiefly because of our sand difficulties, we use cranes to elevate materials at the four operations. Regularly, we find better gradation conditions at our area plants than at the dock operation. Adequate space for efficient blending is not available at the dock. Also, at the dock, only the crane operator is checking regularly on the uniformity and quality of the sand going into the overhead bins. A



Aggregates for this ready mixed concrete plant are stored in compartments with a total capacity of 8000 tons. Materials are reclaimed for transportation to the batching plant by means of a tunnel conveyor

plant superintendent carefully selects the sand that is shipped to area plants. At each area plant the crane operator is burdened with the added responsibility for checking on the gradation of sand that he elevates to storage. If sand is not acceptable, it is placed in stockpile and again blended.

We also use the services of an independent testing laboratory. In an attempt to help us control gradation, one of their trained technicians regularly makes a screen analysis of our sand.

In spite of constant effort, we get an occasional low-strength report on the breakage of test cylinders. Examination of concrete which has broken below anticipated 7-day strength is apt to show a mealy appearance, an indication that the sand contained too many fines.

We don't think that we are unnecessarily concerned about the gradation of the sand economically available for use in our concrete. In fact, we feel that it is up to us to do a much better job on daily efforts to overcome known deficiencies. We believe that concrete sand should be kept within satisfactory limits on gradation, amount of silt, organic matter and moisture content.

Aggregates of one inch (or less) top size may be stockpiled together and only one bin compartment is required for overhead storage. When the range in gradation is from No. 4 to 1½ in., coarse aggregate should not only be sized and graded, but separated as well. In handling of 1½-in. top-size aggregate, two stockpiles and, of course, two overhead compartments are required, with the aggregates separated in accordance with specifications. If the use of still larger stone is required, additional separation should be provided.

At some ready-mixed concrete operations, aggregates containing 1½-in. top size are not graded, merely sized. There is no attention paid to gradation. The stockpile contains anything and everything from No. 4 through 1½ in. At one plant, where sized-only materials were being used, several

screen tests were made on the 1½-in. aggregate; on the first screen analysis 44 percent passed the ½ in.; on the second test, only 5 percent passed the ½-in. screen. When aggregates of such inconsistent gradation are used, the processing of consistent quality concrete is an impossibility. Such operations are a discredit to our industry.

Even though properly graded aggregates have been processed by the supplier, through careless handling and improper stockpiling at the readymixed concrete plant, the aggregates which go into the mixer may actually be poorly graded, due to the presence of harmful amounts of undersized material. Undersize is a product of chipping, breakage and segregation. Undersize is prevented by proper handling procedures. Chipping and breakage are more apt to occur when angular aggregates are being used. Segregation is a more serious problem when uncrushed aggregates are being handled or the coarse aggregate is graded (without separation) from No. 4 clear through 11/2 in. top size. If chipping, breakage and segregation are not closely controlled, the fineness modulus of the aggregate can change considerably, causing harm to both the workability and quality of the concrete that is being processed. The presence of small angular chips in excessive amounts occasions a strength reduction in the concrete and interferes with finishing operations at the job.

Excessive undersized material tends to collect in pockets and get into the mixer in intermittent concentrations. These recurring concentrations present a difficulty that must be faced by many operators, especially by those who take aggregates from stockpile by a tunnel conveyor system. When pockets of undersized material develop, this also means that some loads are reaching the weigh hopper short of these finer particles, required in given amounts in well graded aggregates.

The average ready-mixed concrete operator first handles aggregates that have been received by placing them

## **Increasing Markets for Dry Mix Concrete**

## Sakrete concrete producers hold annual meeting in Los Angeles

ICENSEES REPRESENTING THE SA-KRETE INDUSTRY held their fifth annual meeting at the Biltmore Hotel in Los Angeles, Calif., on February 19-20. Representatives from practically all the licensees were present, coming from such distant points as Cincinnati, Baltimore, Chicago, Salt Lake City, Kansas City, Ft. Worth and El Paso, Texas.

Sakrete is the name given to a carefully controlled dry, pre-mixed concrete, comprising an aggregate (usually gravel but crushed stone is also used), sand, and portland cement. The material is marketed in paper bags of relatively small size and is convenient for the occasional user of concrete. Home owners find it a handy means of making minor repairs; patching concrete walkways, setting posts securely in the ground, etc.

To many this all may seem like small business and in no way comparable with other types of rock products industries but after listening to the opening session where the first subject was a "Report on Investigation of Possibilities to Reduce Rates on Sakrete Products," it was brought out that carload shipments are an important and vital subject to Sakrete manufacturers. One producer said he shipped from 10 to 20 carloads per month, but could increase that by 200 percent if freight rates were more favorable. One company has three plants; one in Maryland, one in the New England states, and a third under construction in Pennsylvania.

Truck shipments are also important to the industry, some shipping for a 300-mile radius. One company reported having 900 distributors with trucks delivering on a "milk-route"

The first day's session was presided over by John C. Stewart of Ft. Worth, Texas. Discussions revolved around a new type of resilient concrete developed by Arthur Avril, nominal head of the Sakrete industries and the man who developed the processing and packaging system.

The resilient concrete, to be marketed under the trade name of Sakrete Resilient Concrete, will be sold in paper bags. It is a dry, powdered admixture that is added to Sakrete's sand mix. It is essentially a floor protective material having resilient qualities so that standing on this concrete is not so tiring on the feet as the more conventional concretes. The mix consists of sand, portland cement (white or normal), finely processed perlite and a dry admix that appears to be the secret key to the

resilient concrete. About 2 lb. per 80-lb. sack of this dry admix is used. The admix costs about 50 cents per pound.

In present Sakrete set-ups, the admix can be added by a small vibrating feeder to the portland cement. On mixing with water the admix is said to disperse rapidly throughout the concrete. When used on wood floors, a light metal lath is nailed to the floor and a coat of the resilient concrete from 1/4 in. to 3/4 in. is spread over the lath and troweled to the desired surface textures. The material sets in a few hours. Chicken wire was suggested as a replacement for metal lath but the idea met with little approval. The material has excellent spreading and durability qualities and can be processed and sold at prices that permit it to compete readily with more expensive floor coverings, both on a price and quality basis.

Mr. Avril told about the resilient concrete being used as a protective coating on the steel decks of portland cement barges in use by the Kosmos Portland Cement Co., Inc. The steel decks were of the riveted type, and the heads of the rivets interfered with cement unloading operations. Previously a wood covering was used but maintenance costs were high. The Sakrete resilient floor covering was tried and even with the warping and twisting incidental to such barge service, the concrete-covered decks proved far superior to the wood. The concrete adheres readily to wood, paper, steel, plaster and other construction materials. Mr. Avril demonstrated its ease of application at the meeting.

Another new product to be marketed under the Sakrete name is a cement paint, also developed by Mr. Avril and his staff. This material is designed mainly as a covering for portland cement concretes. It has good weathering qualities, is durable and easy to apply, and is a dry powdered mixture needing only water to complete the mix. It can be sprayed if desired with no agitator needed in the spray-pot, it was said. One of its important ingredients is the dry admix used in the resilient concrete floor covering. Each producer representative present at the meeting tried his hand at painting a small concrete slab that was supplied by Mr. Avril.

Following the noon luncheon, W. E. Mussett presided at the afternoon session. The meeting was informal and consisted of a round-table discussion of operating costs and deliveries. Delivery costs were expressed in centsper-bag-mile, or equivalents. The ma-

jority hauled in their own trucks, others leased tractors but owned the trailers. Deliveries to a distributor were in most cases based on a 15-bag minimum.

Maintenance suggestions, new methods and equipment in Sakrete operations were also discussed during this session. As all sand for Sakrete must be "bone" dry some of the discussion revolved about how to get dry sand that was not too hot. Hot sand burns the paper bags. One representative said that better results were obtained by firing the rotary kiln at the feed end. Another described the use of Fuller Air-slides for conveying. A blower was used on screens by one company which resulted in longer screen life. During the evening there was a cocktail hour in the "Avril Room" at the Biltmore followed by a dinner.

## **Advertising and Merchandising**

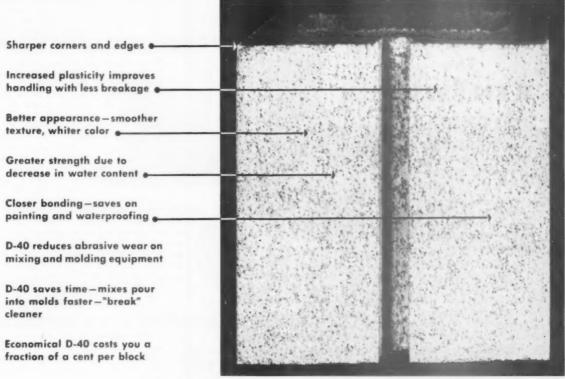
J. D. Stewart of Mill Creek Transit Mix, Inc., Salt Lake City, Utah, presided at the Friday morning session. This session was largely an open discussion of the coordinated advertising program, including national advertising of all types and all local and point-of-sale advertising. Albert Cummins, Harry T. Campbell Sons' Corp.: W. E. Mussett, Dry Mix Concrete Co.; John C. Stewart, Texas Dry Concrete Co.; and Arthur C. Avril of Sakrete, Inc., presented the advertising program which was approved. Evervone agreed to use all of the advertising material, and share the cost of advertising in the various magazines on a subscription basis. The largest portion of the national program was allocated to Better Homes & Gardens and Popular Mechanics,

To supplement the national program, there will be point-of-sale advertising material prepared by the agencies handling the national advertising, consisting of metal signs, banners, newspaper mats, radio script, television shorts, mailing circulars, etc. It has been estimated that the entire advertising program will involve an expenditure of nearly \$500,000

The luncheon session, under the chairmanship of A. C. Avril, included the election of the executive committee for 1953 and the selection of Atlantic City as the place for the 1953 meeting during the first week in December. The committee was reelected.

Albert Cummins, Harry T. Campbell Sons' Corp., Baltimore, Md., was chairman of the afternoon session which was devoted to a discussion of merchandising methods.

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You will be amazed at the outstanding results obtained by adding one to two ounces of dry, granular D-40 per bag of cement at the mixer. D-40 is a ready-to-use additive supplied in economical 85# bags by Oronite, the world's largest producer of synthetic detergent raw materials.

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A compact machine combin-



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See this machine. Study it. Ask questions. Then arrange for early installation and a new and satisfactory experience in block making.

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ABREAST
WITH
INDUSTRY
TRENDS
THROUGH
ROCK
PRODUCTS

## Continuous Kiln

(Continued from page 215)

nace, producing 2,600,000 B.t.u./hr. Only 2,000,000 B.t.u. are generally used, however. The unit is located in a small penthouse over the exit end of the kiln. Each of the oil burners uses 8 gal./hr. Less than 2000 gal. cure one month's production of 150,000 8-in. units. The water requirement is 800 gal./hr., sprayed into the furnace, enough to give each block about 1 lb. Automatic controls assure proper amount of saturated air production. This air enters the kiln for 60 ft. along the bottom of the kiln. beginning about 30 ft. from the exit door. The 4-in. cavity in the kiln wall is used as a pipe, and every other block in the bottom course of the inner wall is removed to provide entrance into the kiln. When it was found that too much heat was being lost through the full height of the outside wall, aluminum sheets were placed in the cavity to confine the air input to the bottom two or three courses. Temperatures in the kiln gradually decrease from the 180-190 deg. F. input section to 80 deg. F. at the preheating entrance.

Outside aggregate storage facilities consist of eight 300 cu. yd. steel bins. Materials stocked are  $r_0^2$  in. minus sand, plus %-in. minus ¾-in. gravel,  $r_0^3$ -in. gravel, %-in. gravel, plus %-in. minus 1¼-in. gravel, road gravel and mason sand (see drawing). The company has its own crusher, a Nordberg gyratory, which is fed by a reciprocating feeder. A 24-in. belt conveyor connects the crusher house with the screening plant over the steel bins. A second long, inclined 36-in. belt conveyor connects the storage bins with the batching

plant bins

Roof of the kiln consists of 6-in. thick Flexicore with the ends capped, then 6 in. of slag topped with 2 in. of concrete. Walls are two 4-in. thick concrete block walls with a 4-in. cavity. For the 60 ft. of the kiln where steam is admitted, the inner wall is 8 in. thick.

### F & A Licensees

Roy Darden Industries, Inc., producer of F & A floor and roof systems, recently announced the addition of two more firms to its group of F & A licensees. The two new licensees are Economy Block Co., Wauwatosa, Wis., which has the entire state of Wisconsin as its exclusive territory, and Louis Foster's Lumber and Builders Supply Co., Port Huron, Mich., which is sole distributor for several surrounding counties. There are now a total of 19 F & A licensees operating in 24 states.

## **Celebrates Anniversary**

THE ASBESTOS-CEMENT PRODUCTS ASSOCIATION recently observed its 15th anniversary. The association reports that since its inception in 1937, yearly production of asbestos-cement siding shingles has more than tripled.

these Outstanding CHALLENGE FEATURES

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NEW STANDARD

TRUCK MIXER EFFICIENCY

FIRST, THERE'S THE CHALLENGE PATENTED "DAM"\* ... a unique system of baffle plates integrally welded to the rear cone section. The Challenge "DAM" makes the drum seal obsolete . . . prevents spillage even on steep grades. But the "DAM" does more! It cooperates actively in the thorough, uniform mixing action for which Challenge is famous . . . and helps in fast, efficient discharge as well. No payload-eating dead weight here . . . or useless contraptions that add to maintenance costs.

\*U. S. Patent #2,618,472

SECOND, THERE'S THE CHALLENGE CONTINU-OUS TYPE "THORO-MIX" BLADES ... working with the reverse fins in the head section of the drum providing continuous agitation, continuous blending of aggregate, cement and water to form concrete that's uniformly and thoroughly mixed. Here is a Truck Mixer that mixes at top efficiency!

> THIRD, THERE'S THE LOW 14° DRUM ANGLE . . . adopted by Challenge engineers after extensive research demonstrated maximum mixing and discharge efficiency from this angle. The low 14° angle of the drum assures faster discharge of the lowest slump concrete, yet

> maintains highest discharge height above the truck chassis while holding, overall loading height to

> > ncorporated in Challenge just by studying these pictures . . . but you've really get to see a Challenge in action to know how they add up to more you. Your Challenge dealer will be glad Kstrate, at no cost.

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Like no other basic building material Rainbow Rock is the answer to today's building need ...

For Reduced Costs . .

Distinctive outer surface walls with warmth of beauty never before achieved can now be built with lower material costs and with amazing savings in laying time. The larger size of Rainbow Rock . . . a revolutionary adobe slump concrete brick . . . accounts for this impressive fact: Comparative time studies with regular brick reveal that Rainbow Rock makes possible a ½ SAVING IN LABOR COST!

And the interchangeable use of three types of surfaces on each brick simplifies inventory and storage problems, further reduces the builders' necessary investment, makes possible the achievement of unusual visual effects

with minimum expenditure of effort and time!

For Greater Eye-appeal...

The effects it is possible to attain with Rainbow Rock are limited only by the imagination and creative abilities of the builder. It is made in a large variety of soft blended-to-order pastel colors, comes in three different thick-11/2", 21/2", 31/2"), and each brick has three different types of surone side smooth, the other side and top distinctively textured, all of which can be used interchangeably. Rainbow Rock can be easily broken by the mason into random lengths of his choice. It provides an unusually luxurious effect. And the pastel colors will retain their beauty under all weather conditions for the lifetime of the structure!

For Maximum Variety of Uses . .

The unusual beauty, economy and versatility of Rainbow Rock makes possible its use for indoor decorative as well as outdoor purposes to a far greater extent than has been possible with any other material.

Fireplaces are given new prominence in living room decor... with color and design tailor-made for pleasing contrast or to blend with their surroundings. Room partitions, solid interior walls and indoor gardens are given new visual interest. Here, too, the wide choice of colors, the different brick sizes and combinations of surface textures can be blended to create an effect of awe-

The low cost of Rainbow Rock makes possible its lavish use for new beauty in DRIVEWAYS, GARDEN WALLS, WALKS, BREEZEWAYS AND GARAGES... in addition to its use for luxurious effects in OUTSIDE

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New low cost General Rainbow Rock Machine earns \$200 per day; produces

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GENERAL ENGINES CO., Inc., Dept. RP-43, 307 Hunter St., Gloucester, N.J.

## Ready Mix Meetings

tions had been issued which would further limit the population density within which radio might be operated which indicates that his company would likely have to give up the use of industrial radio after the 3-yr. amortization period provided to write off the equipment.

In the discussion period following, one producer said that he leases the equipment and that the local utility bills the company on a per-call basis. In spite of the adverse ruling received, Mr. Hagan, in answer to a question, said that producers should get their applications for industrial radio filed as quickly as possible. It was emphasized that the new rules are proposed and not necessarily final. that they have not yet been put to enforcement and that every effort will be made by the associations to have them changed. One producer reported that he is getting 50 cents more than his competitors per cu. yd. of readymixed concrete because he has the advantages of radio. He said that maintenance costs are much lower with the newer units than for those used by Graham.

## **Ohio Meeting**

Ohio Ready Mixed Concrete Association held its annual meeting commencing with breakfast. The meeting was well attended at which time Claude L. Clark, executive secretary for the Ohio group made his report. Others who spoke briefly and informally were Stephen Stepanian, Arrow Sand & Gravel Co., Columbus, Ohio; Russell P. Mumford, Springfield, Ohio; and James Nicholson, Nicholson Concrete Co., Toledo, Ohio. Mr. Nicholson also was moderator for the meeting.

## Holds Open House

SHUTE CONCRETE PRODUCTS recently held open house at its new block plant east of Richmond, Ind. The visitors were taken on a tour of the plant to watch the production of concrete block. The plant features a Besser Vibrapac block machine.



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## **Handling Aggregates**

in stockpiles. The ground space for the aggregate storage should be paved or else contain sufficient bottom material so that contamination from mud or dirt is most unlikely. The storage piles should be far enough apart, or separated by retaining walls, that there is no possibility of infiltration of materials.

#### **Preventing Segregation**

To prevent segregation, breakage and chipping the stockpile must be properly built up. Dropping aggregates continuously at one point by inclined conveyor or crane bucket to form a cone is not the way to build a stockpile. Such a procedure, however, is certain to cause harmful segregation. Dumping aggregates by truck from an elevated position—letting the material roll down a slope—is another widely used but similarly improper procedure. Again harmful segregation results.

To build a stockpile properly, keep it flat by building it up in horizontal (about 4 ft. thick) layers. Aggregates should be so handled that they remain in the place where they are put. The rolling of aggregates to lower levels must be stopped. As a pile is built up, with the necessary shortening of the perimeter, a cone shaped top may finally result. However, if the materials have been placed in flat layers, no harmful segregation will have developed. A stockpile can be built in this manner through the efficient handling of a crane, swinging conveyor, dump truck or bulldozer. Precautions should be taken that aggregates will not be ground into smaller particles by trucks or bulldozers operating repeatedly over the same levels in building storage. Care should also be taken that coarse aggregates are not dropped great heights. Expected breakage and segregation can be largely eliminated through the use of baffles or rock ladders.

The handling of the aggregates in overhead storage requires good planning and careful execution. Certain fundamentals should be observed.

If undersize is a problem with a certain sized aggregate, regularly each day the bin compartment should be completely emptied to prevent accumulations of this fine material.

Aggregates should not be dropped unnecessary heights. Wind and dropping can separate sand sizes. Dropping of coarse aggregate can cause segregation and breakage. Plan handling of materials so that discharge from elevating equipment is as low as possible and over the center of each compartment; then keep each individual compartment as full as practical at all times. If long dropping is necessary, break or otherwise control the fall. Adopt handling procedures that will stop bridging of the sand, breakage of the coarse aggregate and segregation of all the materials.

If a turnhead is used, the chutes to individual compartments should be set up to prevent segregation. In some plants, a chute from the turnhead to a bin compartment may be acting as a material separator. Avoid the use of a short chute which barely reaches over the edge of a compartment. Drop material straight down. Stay away from angle chuting. Use a baffle or stone box to force the material to fall vertically from a discharge point near the center of a compartment. If segregation is a serious problem, consideration should be given to the use of a compartment haffle.

Prevent materials from getting mixed with one another through careless manipulation of the turnhead, improper handling of the crane, and leakage between or over compartment sides. The turnhead, material bucket, bin sides and partition boards should be regularly inspected. It is embarrassing to have a testing engineer point out to you the source of trouble, which should have been prevented. It has happened to us and to others.

Avoid the use of low partition boards. Boards between compartments should be built at least as high as material is ever piled in the center of a compartment. Never permit a situation to continue where infiltration of materials is regularly occurring.

Operation of the crane and material bucket must be carefully watched. Larger size aggregates should never be swung over compartments containing finer material. If a four-compartment, in-line bin is being used, finer aggregates should be placed in the two center compartments or in the two compartments comprising one half of the bin. Coarse aggregates should be elevated and swung from the other direction. Top-size aggregate should always be placed in an outside bin. The jaws of the material bucket should be properly maintained to prevent unexcusable dropping of material into the wrong compartment.

Unless ready-mixed concrete operators so handle materials that properly graded aggregates regularly reach the mixer, specification writers will force them to further separate the aggregate into a greater number of sizes and may even require finishscreening at the ready-mixed concrete plant.

You should regularly check the efficiency of your own operations:

- Is the aggregate which you are putting into your mixer as well graded as the material that you received from the supplier?
- Are any handling procedures causing unnecessary segregation, infiltration or breakage?
- How consistent in grading are consecutive weigh hopper batches?
- 4. Is the matter of "undersize" an operating problem?
- 5. What changes can be made to improve handling routines?

## Burmeister

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● In addition to reducing plant height, Burmeister's 3 cu. yd. "Tilt-Up" Mixer (left) provides a steeper 65° discharge from one spot, eliminates segregation of concrete and the danger of accidental discharge. It is simple to install, and has an integral hydraulic system—no compressor is required. Write for name of your nearest Burmeister Distributor, without obligation.

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## **Pipe Conventions**

(Continued from page 225)
Plant superintendent can do the job himself.

Mr. Curtis said that the cost of mortar joints is going up and the Bureau is going very largely to rubber gasket joints, but five types of mortar joints are now accepted. Basically there are two types of rubber gasket joints: the round type (good for high pressure), and the compression type which is of advantage as rubber stands up best under compression rather than tension. Mr. Mollendorf asked if the packer head pipe had ever been made with the object of using a rubber gasket. Mr. Bluedorn said that it could be done, but the pipe must be very accurately made. Dick Carroll asked why the Engineer Corps specified that a rubber gasket joint be covered with a collar of concrete. Collar is specified to prevent movement, according to Mr. Miller. The bore is smoothed up by grouting where turbulence is present. Mr. Curtis said that grouting is only required where the opening is more than 1 in. Mr. Carnwath uses aluminum stearate to paint forms to obtain a smooth finish on pipe up to 78 in.

Mr. Mollendorf said that no-slump concrete could be used for cast pipe, but some pit holes showed up. Vibrators were used on the outside of the form. If heavier pipe walls were used, it might be possible to make a very acceptable pipe. Dick Carroll uses a little soluble oil on forms to prevent pit holes on packer head and cast pipe. The soluble oil is cut 5 to 1 with water. Scott Grivas uses wet burlap sacks for curing outside in summer, and steam is provided in the winter by a steam generator suitable for automobile cleaning. Mr. LaDue told about using an aluminum band with a packer head pipe machine to get accuracy in manufacturing pipe for use with rubber gaskets.

Mr. Chutter said that he had used fine pumicite in the mix with resulting increase in strength, but the pumicite had speeded up the set. Mr. Cain said that there are all kinds of pozzolans, and care should be used in their selection. Pozzalans increased resistance to hydrogen sulphide. Fly ash cuts costs of pipe manufacture as it reduces the amount of cement required. It also substitutes for fine sand to correct gradation, and makes the mix more workable.

J. J. Seale asked Mr. Osweiler to tell about his method of using an ammeter on the mixer to control slump. Harry Tormey of New Orleans makes corrections in sand when weather is rainy. A moisture test is run in the morning, using the liquid displacement method and table for correction; a similar test is run in the afternoon.

W. I. Fleetwood told about his company's regular maintenance schedule for machinery, particularly for mixers. Parts subject to breakage are replaced at regular intervals. Elevator belts are replaced every 1½ years. Check lists are not used, but men are trained to follow up maintenance. Several reported they are using rust-proofing compounds made by the oil companies. Mr. Curtis said that Waterman Industries in California is one of the manufacturers making a suitable valve to be used between concrete and cast iron sewer pipe.

In most areas, concrete pipe manufacturers reported that they could compete successfully for septic tank business. In some areas steel tanks are rusting out which has helped to promote the sale of concrete septic tanks. J. J. Seale said that they had sold 42-in. pipe for septic tanks. Mr. Grivas said he could sell 300-gal. capacity tanks competitively.

No experience was reported with intrusion "prepakt" method for forming joints, but the joints made with a cement gun were successful on the Pacific Coast. Mr. Osweiler told about his experience with "gunite" joints on 60-in. pipe in long lengths. Mr. Corbett reported that C-13 permits use of sand-filled hose or hard rubber strips in making three-edge bearing tests.

On the question of city ordinances forbidding industry to dump acid or alkaline wastes, Mr. Chutter said that Los Angeles and Fresno had such ordinances. Mr. Corbett said that Connecticut checks acid waste dumping by prohibiting waste with less than 5½ pH.









Kennedy Concrete Block Co., Philadelphia, was plagued with the same problem that faces most concrete products manufacturers: laborious, time-consuming unloading at customerselected locations. This firm's solution is a GERLINGER Material Carrier, designed to drop cube loads with no manual labor or use of pallets.

The Gerlinger is equipped with a movable holding plate that is held by the carrier's shoes. Cube loads of 400 blocks are placed on the plate by the yard lift truck, and are unloaded at the customer's location by merely dropping the shoes. A push-bar shoves the load off the steel plate. Mr. Garfield Kennedy, president, says: "It takes our Gerlinger driver only three minutes to drop a load. The use of this system has speeded up our deliveries and eliminated expensive manual handling."

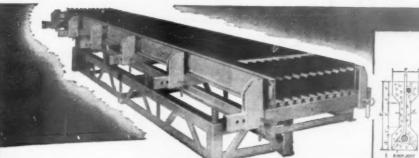
For complete details, drop us a card. We'll gladly send you our free catalog showing all models of Gerlinger Material Carriers.

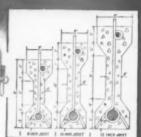
**TOP:** Movable plate equipped with four rows of rollers held in place by the Gerlinger's shoes.

CENTER: Cube loads are loaded by yard

**BOTTOM:** Push-bar mechanism mounted at rear of Gerlinger, powered through a universal connection to the carrier's motor

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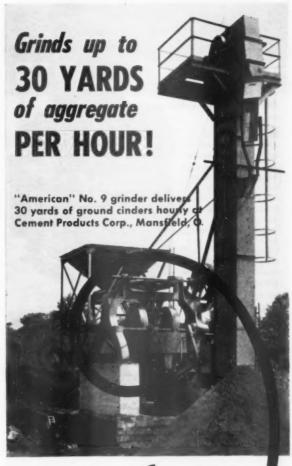
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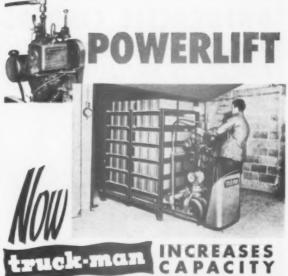
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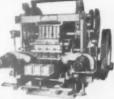
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\$300,000.00 concrete products plant consisting of 20 acres plant site; one new block plant; one new drain tile and concrete well curbing plant; one main plant covering 20,000 square feet. This space includes the culvert pipe division and small drain tile; one repair shop 1700 square feet; one gravel washing plant: six acres of good gravel land. Capacity of manufactured products 400 ton per day or approximately one million dollars per year, figuring nine months to the year. Don't write unless you expect to buy this plant complete, real estate and all. Will not sell machinery separate.

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#### Machinery for a Brikcrete Plant

We have taken over all the Machinery from a Washington Plant. Now we have one set of Machines we wish to dispose of at a very attractive price.

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THROUGH

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1 Concrete Transport 3-yard Hi-Lo Mixer mounted on 1940 Chevrolet with The

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  1—Attachment to make 7½ x 7½ x 15½ 50% A.S. blocks, 5000—7½ 50% Pressed Steel pallets.

  55—Chase racks 72 block capacity.

  2—Turntables 84" diameter.

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28' mixer, new,

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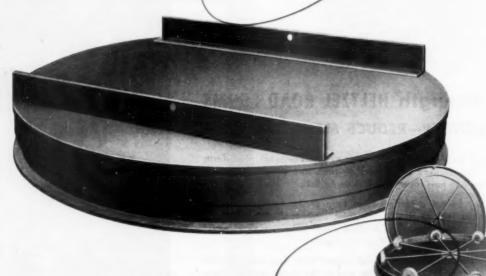
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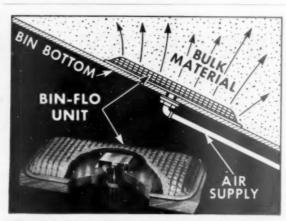


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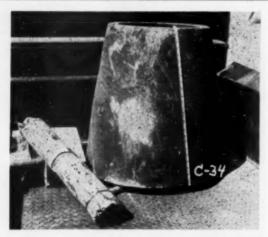
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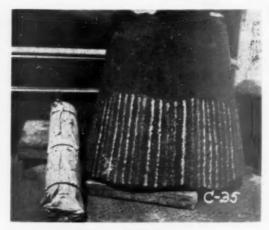


PRAGUE &

Mining Catalogues.

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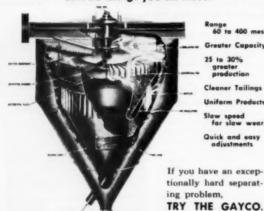
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Streamline loading, stockpiling, clean-up jobs . . . move large loads over rough, unpaved yards at high speed! Handle all load shapes and sizes in less time with easy-steering, heavy-duty MM Wheelers. On every job, MM Wheelers are money-makers. They're lower in first cost because MM high-production cuts manufacturing costs. Extra speed and capacity hold down operating costs, help you show a better profit job-after-job.

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MM meneuverability lets Wheelers work in tightest spots. Handling ease cuts aperator fatique, boosts operator efficiency.

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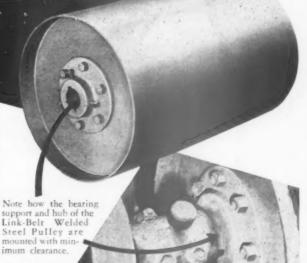
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end one common cause of head
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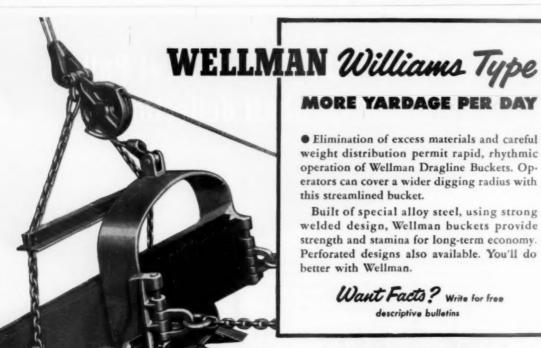


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34 Model 71FDT with 89W Wagons, 13 cu. yd. capy., 1951 10 Model 67FDT with 58W Wagons, 13 cu. yd. capy., 1950 8 Model 38FDT with 89W Wagons, 13 cu. yd. capy., 1950 34 Model 43FDT with 58W Wagons, 13 cu. yd. capy., 1946-1950

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9 Model 8TD with 56Y Bodies, 16.8 cu. yds., 1950 5 Model 49FD with 48BY Bodies, 12 cu. yds., 1947 2 Model 49FD with 12BY Bodies, 12 cu. yds., 1947

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2 Model 98V with GM Diesel Engines, 1951 Model 109W Dolly for 98V Loaders, 1951 Model No. 38V with a Cummins Diesel Engine, 1946

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2 No. 1055 P & H 3 cu. yd. Shovels with Buda Diesel Engines, 1948 No. 54B Bucyrus Erie 2½ yd. Shovel, Buda Lanova Pawered, 1947 Day Smith Lugger Crane, Type 100 Oshkosh Tractor Crane Model TE with Gar Wood Crane

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1950 Plymouth 4-Door Sedan

1948 Reo 2-ton Platform Truck

K-30 Rooter
3 Rock Rakes
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24 Atlantic Transformers from 15 to 100 KVA

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10"	4	1/16"	1/32"	28 Oz.
12"	4	1/16"	1/32"	28 Ox.
14"	4	1/16"	1/32"	28 Oz.
16"	4	1/8"	1/32"	28 Oz.
14" 16" 18"	4	1/8"	1/32"	28 Ox.
20" 20" 24"	4	1/8"	1/32"	28 Ox.
20"	5	1/8"	1/32"	28 Ox.
24"	4	1/8"	1/32"	28 Ox.
24"	5	1/8"	1/32"	28 Oz.
26"	5	1/8"	1/32"	28 Ox.
26" 30"	4	1/8"	1/16"	32 Ox.
30"	5	1/8"	1/16"	32 Oz.
30"	6	1/8"	1/16"	32 Oz.
36"	6	1/8"	1/16"	32 Oz.
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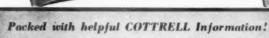
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This is the new Caterpillar No. 6 Shovel. It loads, excavates, strips, stockpiles, 'dozes, feeds hoppers, moves mine and railroad cars and handles haul road maintenance—a hard-working unit around any pit. Here, take a close look:

The shovel frame and tractor are welded and bolted together. This is one unit — big, tough and completely Caterpillar built.

That bucket is 96 in. across, scoops up 2 cu. yd. easily, and has 66 HP behind its hard-faced cutting edge of high-carbon steel. There's a 35° automatic tip-back which holds the load in the bucket, and a 50° dump angle, with impact shaking, to get rid of even the stickiest material quickly and cleanly.

The bucket is wider than the widest part of the tractor. You can work close to walls, and cut sidewalls clean, with this shovel.

Those crawler tracks are extra long and designed

especially for this unit. They're non-oscillating, too, for added stability and finer grading.

The Caterpillar-built hydraulic system lets the operator raise and dump at the same time and features an automatic kick-out. And the operator sits high and clear, with excellent visibility of the bucket's sides, back and corners. Yet the unit's over-all height (6 ft. 11 in.) is low enough for working in tight places and low overhead areas.

Your Caterpillar Dealer is anxious to demonstrate the No. 6 Shovel for you. Give him a call.

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